Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 1 of 42

10/537963

Human CD20 Transgene expression in mouse B220⁺ cell

Tg

MFI=5

$Tg^{+/-}$

MFI=109

$Tg^{+/+}$

MFI=255

Cell Number

Human CD20

Figure 1

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 2 of 42

Figure 2

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 3 of 42
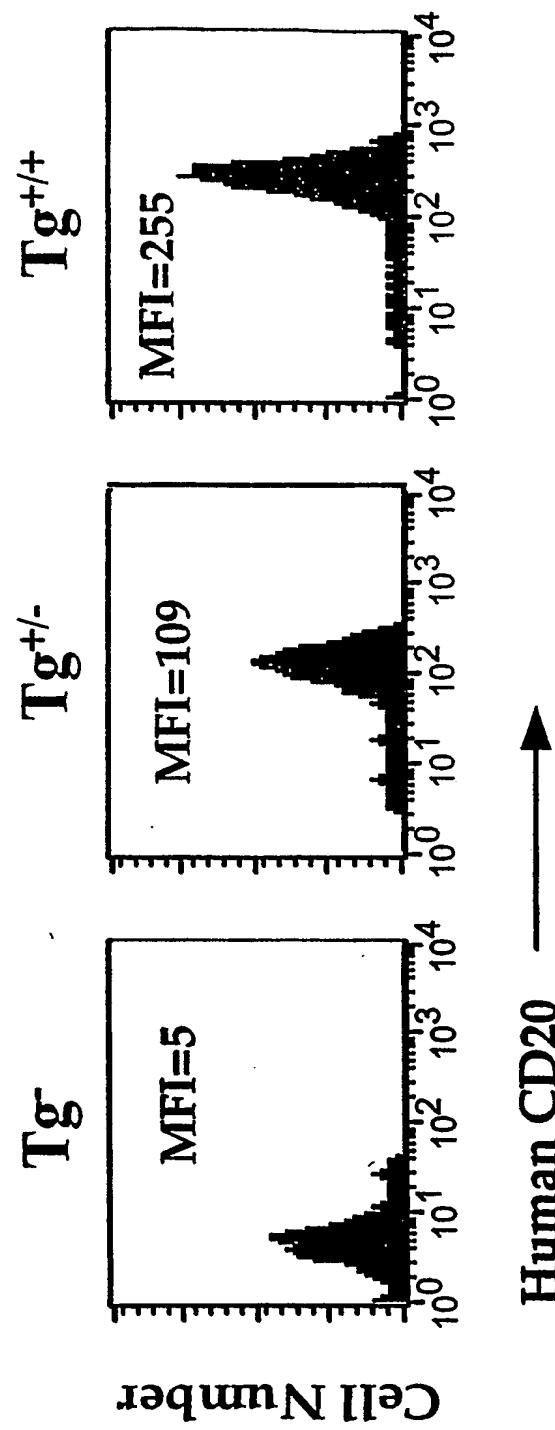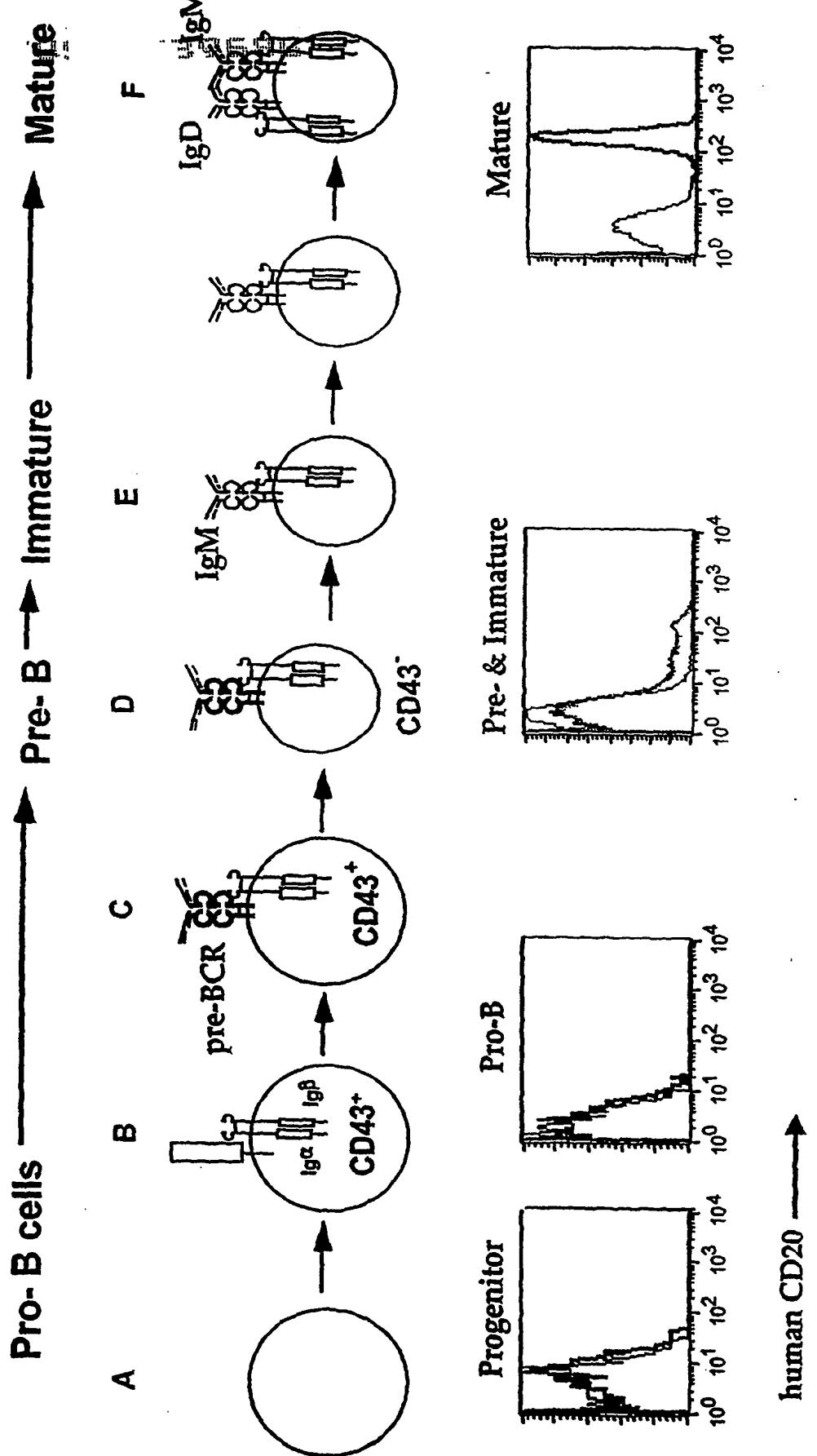
Expression of human CD20 in Tg⁺ mouse bone marrow

Figure 3

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 4 of 42
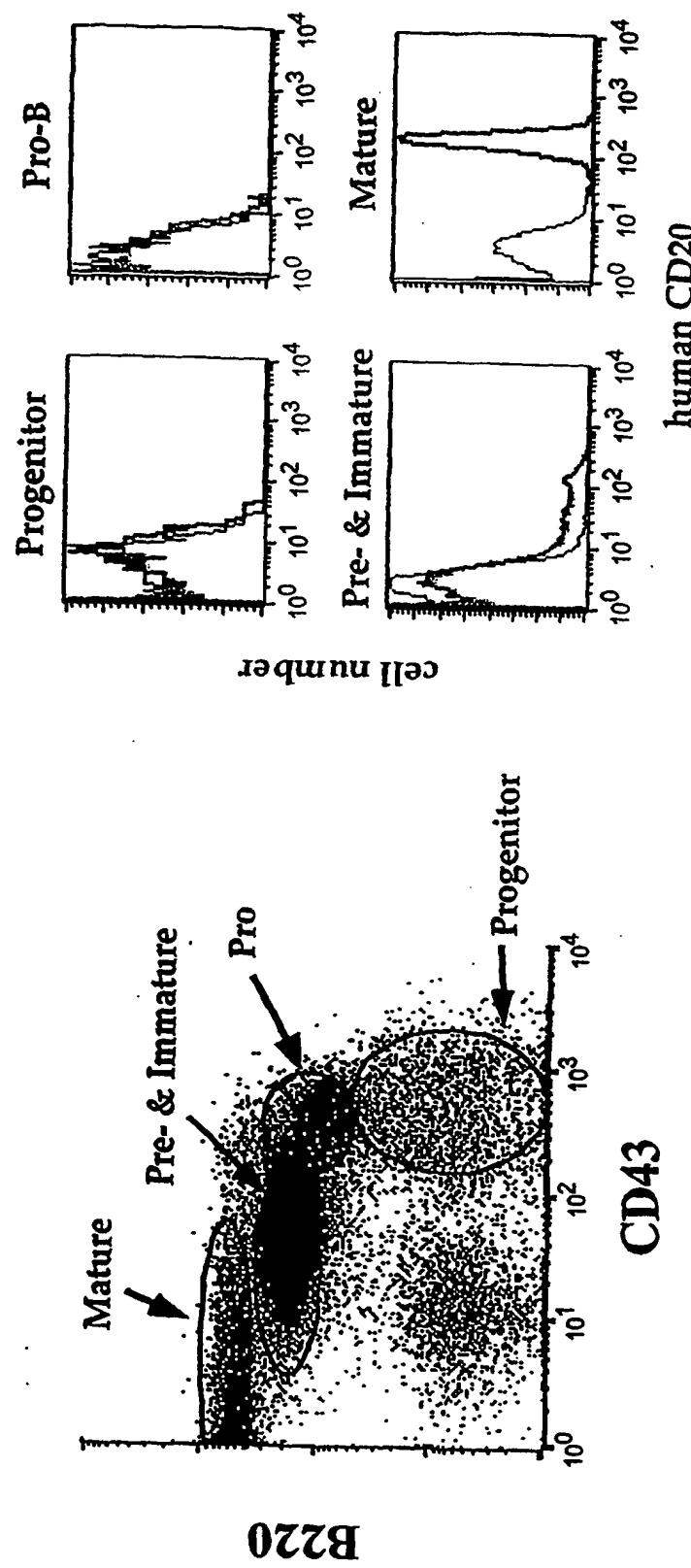
Expression of human CD20 in Tg⁺ mouse splenic B cells

Figure 4

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 5 of 42
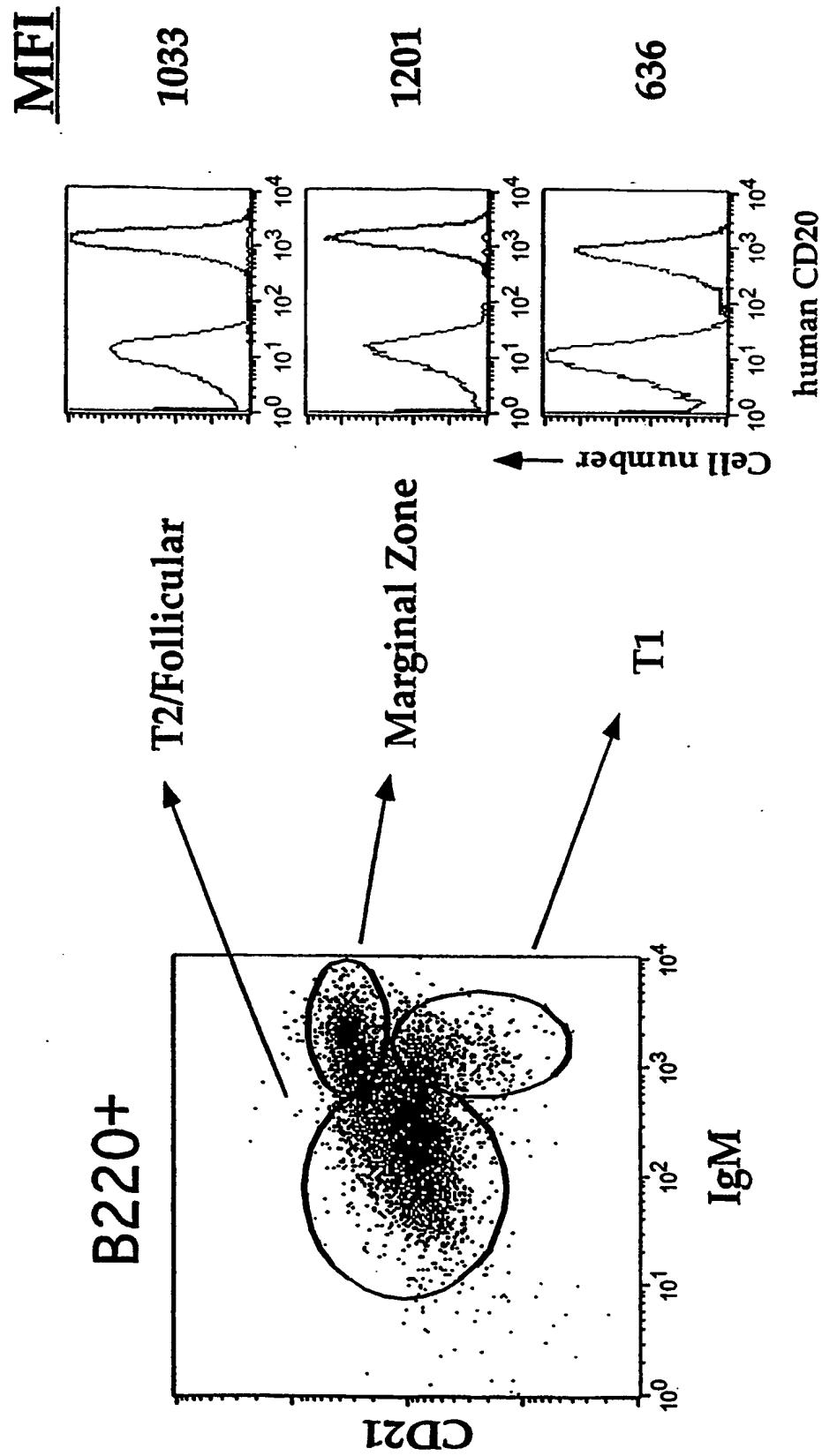
10/537963

Expression of human CD20 in Tg⁺ mesenteric LNs

Figure 5

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 6 of 42
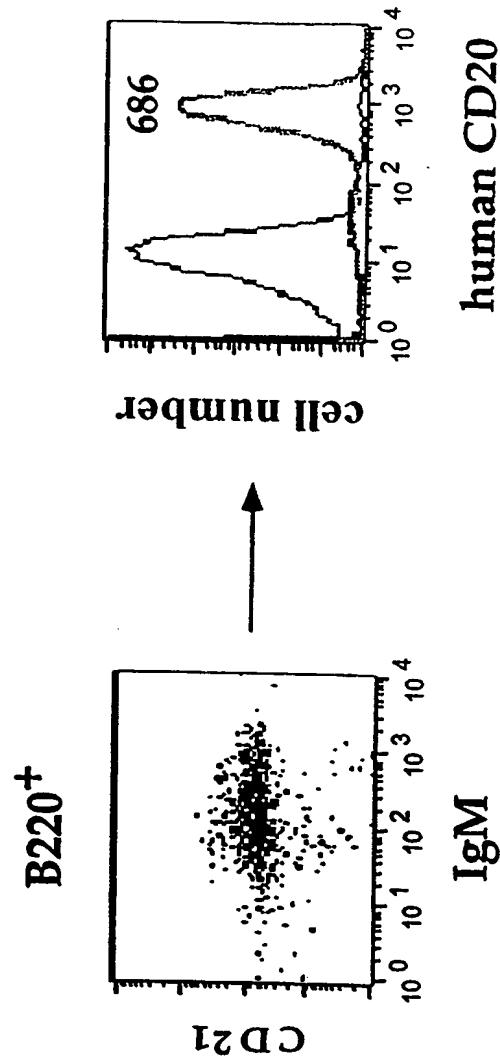
10/537963

Expression of human CD20 in Tg⁺ Peyer's Patches

Figure 6

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 7 of 42
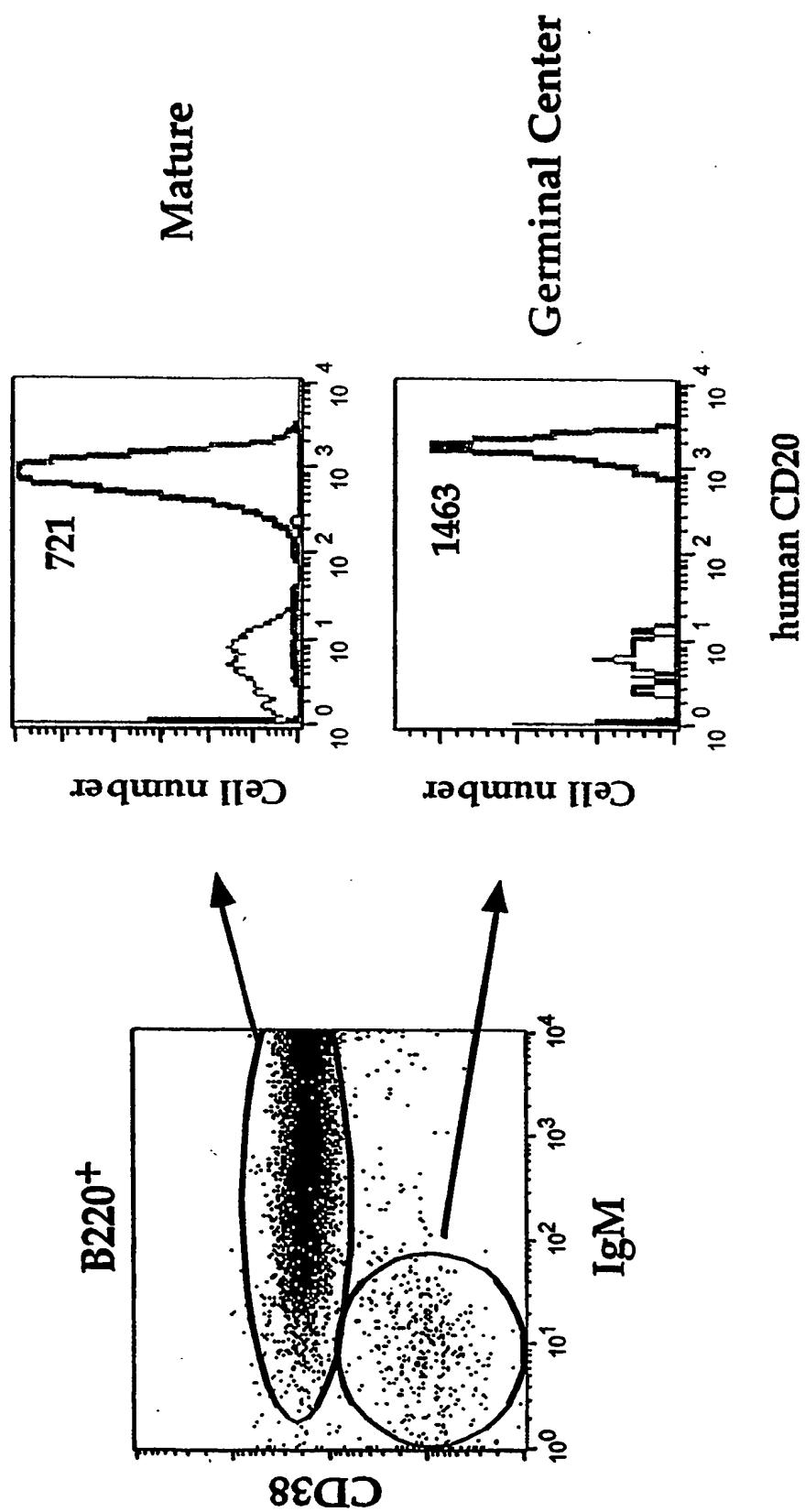
Effects of anti-CD20 mAb in mice

1.0 mg anti-CD20 mAb   [=50 mg/kg: 3.5 gm for 70 kg man]

Day -1 1 2 3 4 7 14 21

FACS
Peripheral Blood
Spleen
LN
Bone Marrow
Peyer's Patch
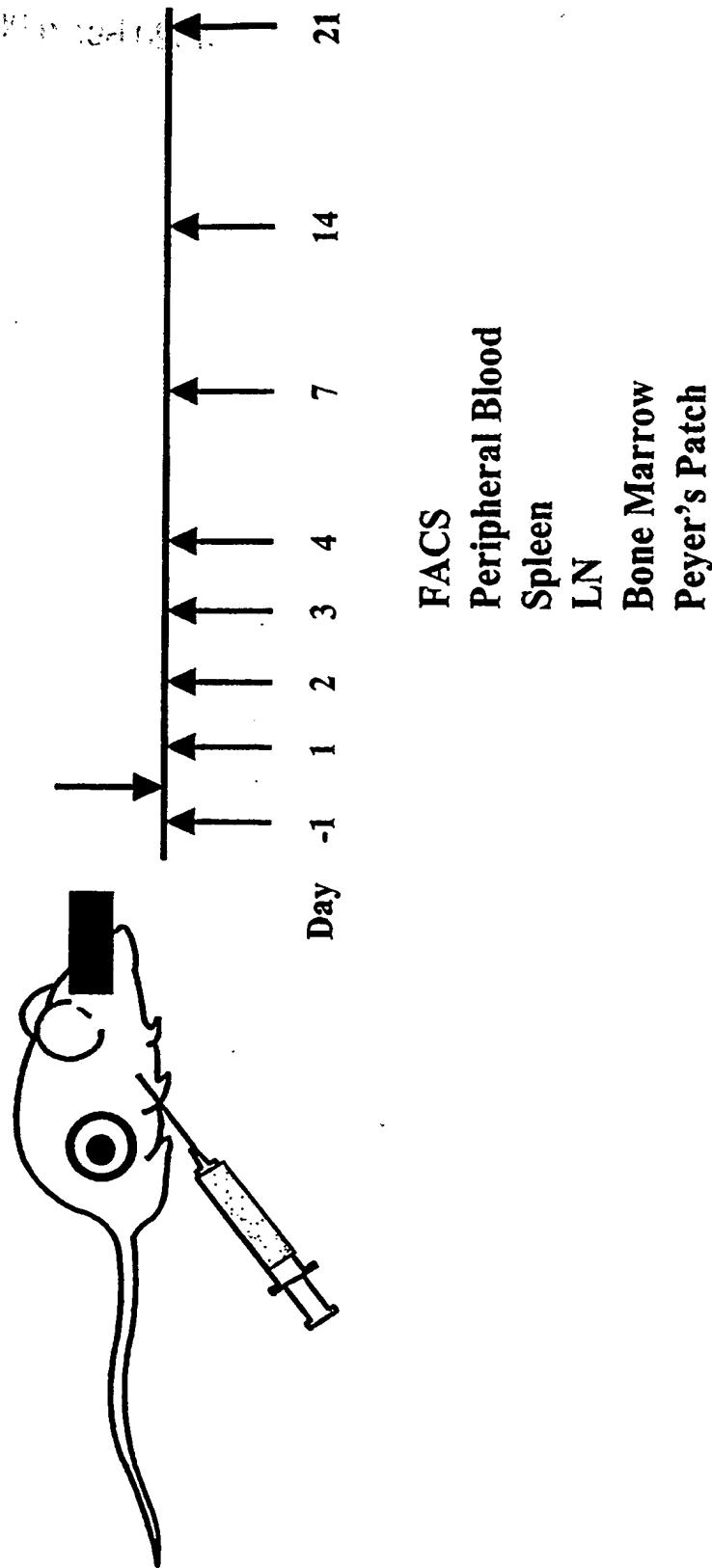
Serum levels of anti-CD20 mAb

Figure 7

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 8 of 42

10/537963

Depletion of peripheral B cells with anti-CD20 mAbs

Figure 8

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 9 of 42
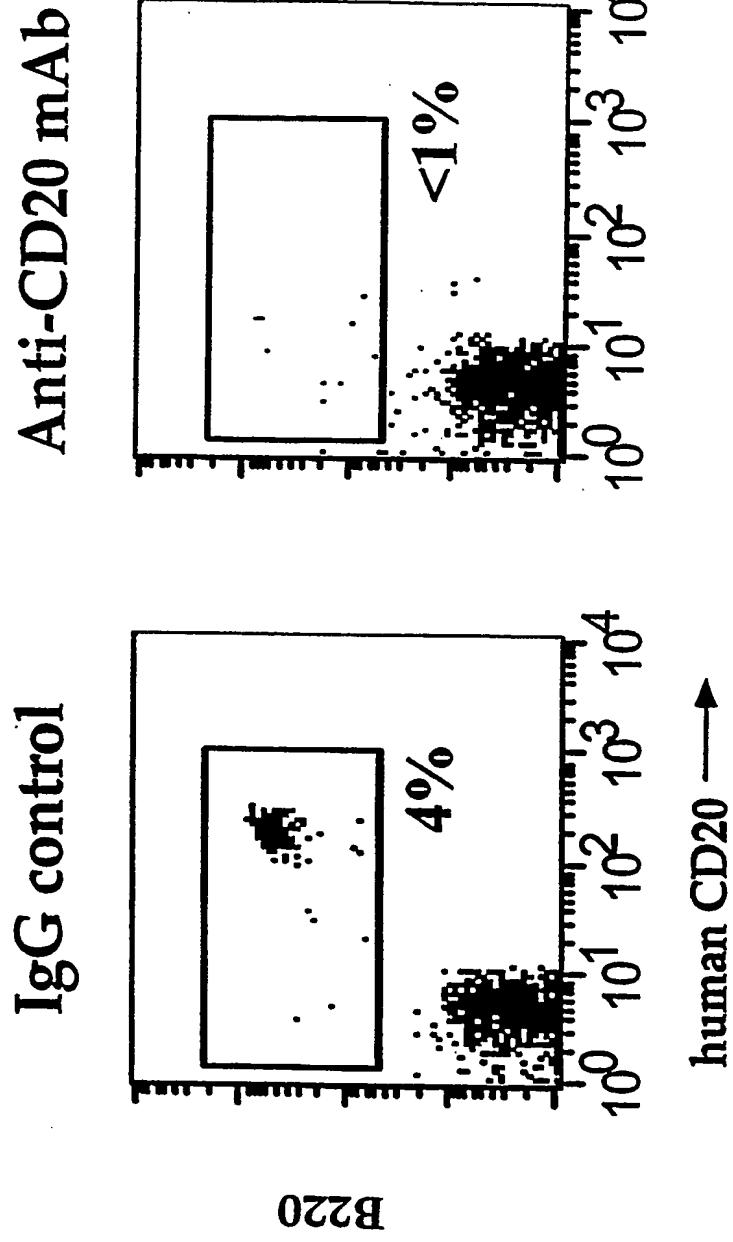
10/537963

Depletion of mature peripheral LN B cells by anti-CD20 mAb

Figure 9

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 10 of 42
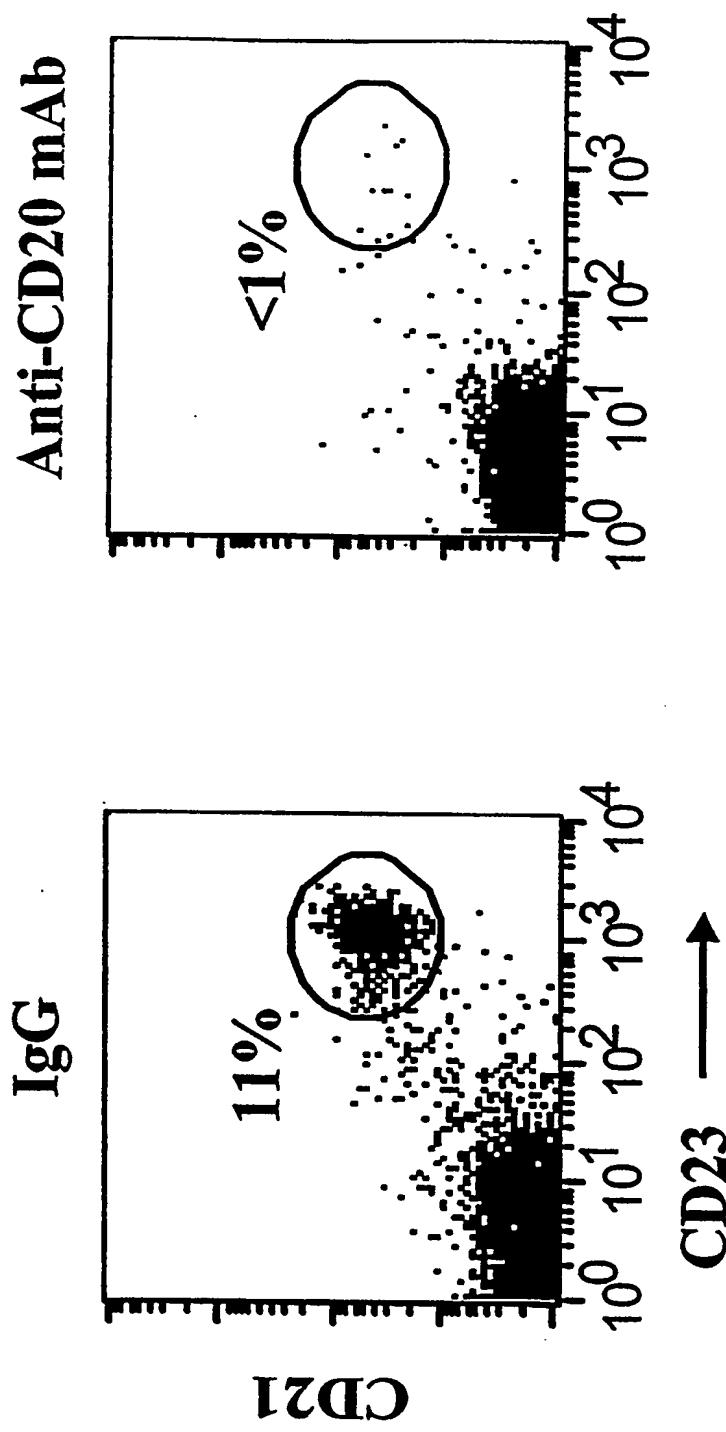
10/53796

Depletion of splenic T2 B cells by anti-CD20 mAbs

Figure 10

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 11 of 42
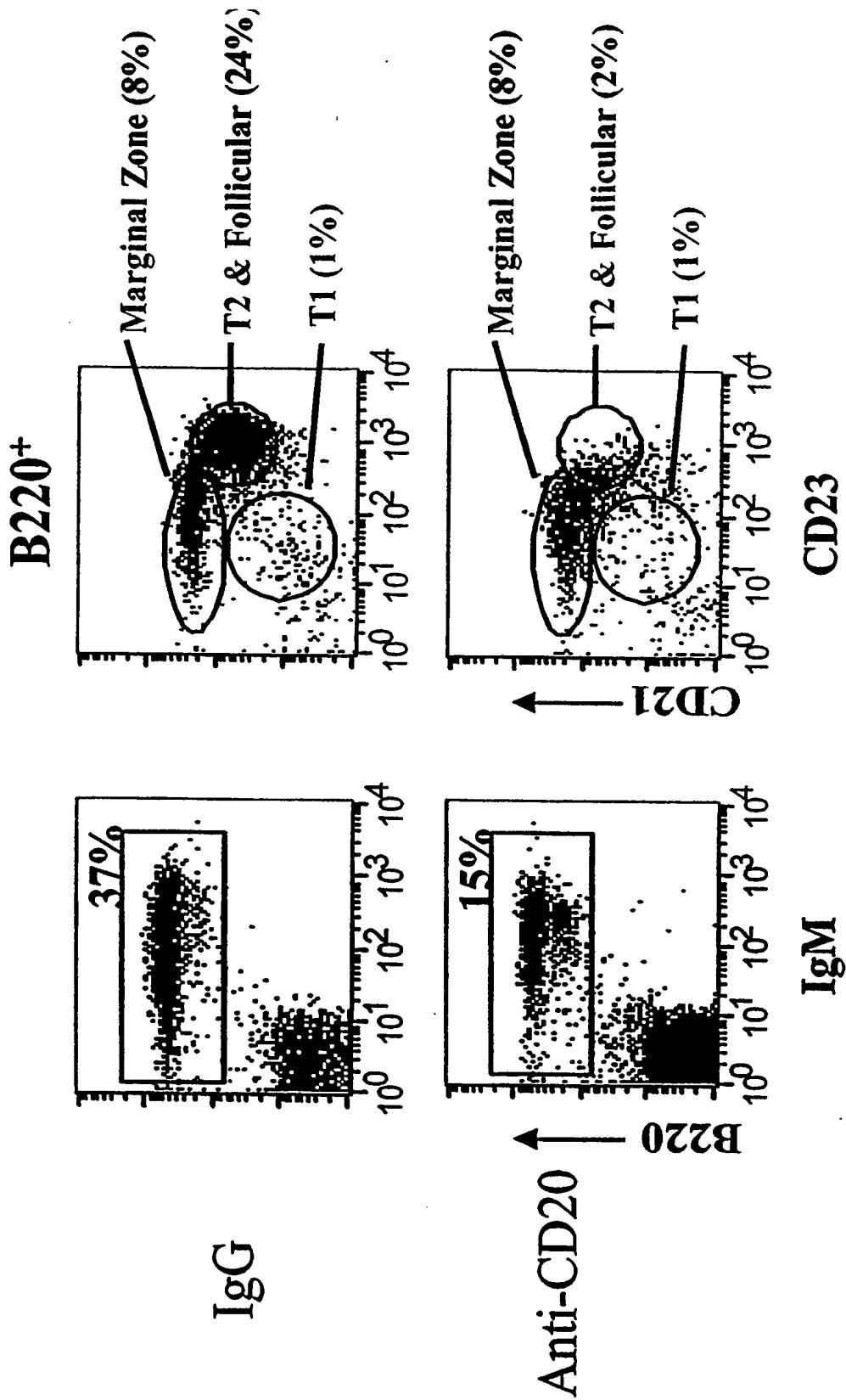
10/537963

Depletion of re-circulating mature B cells by anti-CD20 mAbs

Figure 11

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 12 of 42
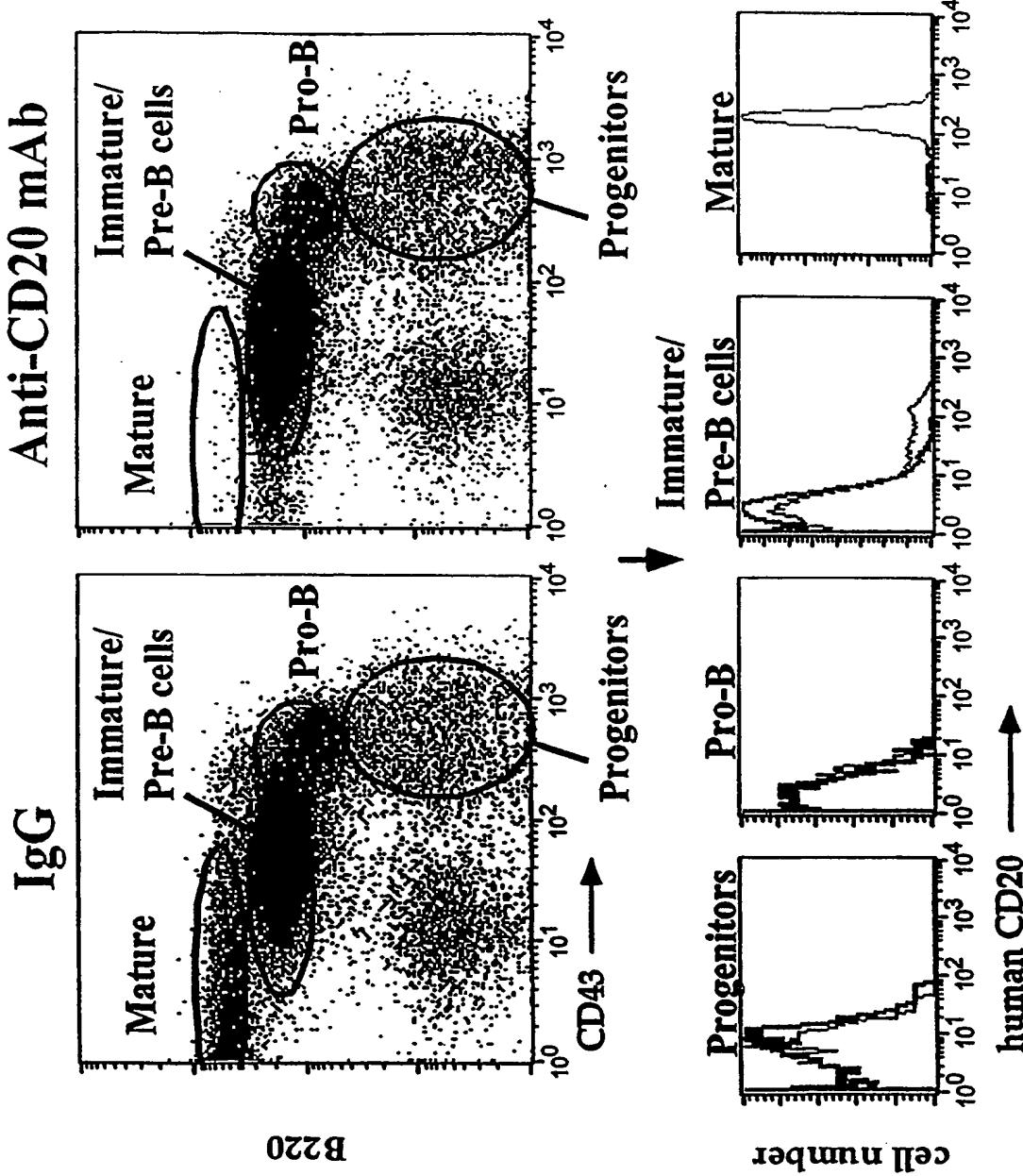
10/537963

Resistance of Peyer's Patches Germinal Center B cells
to anti-CD20 mAbs

Figure 12

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 13 of 42

10/537963
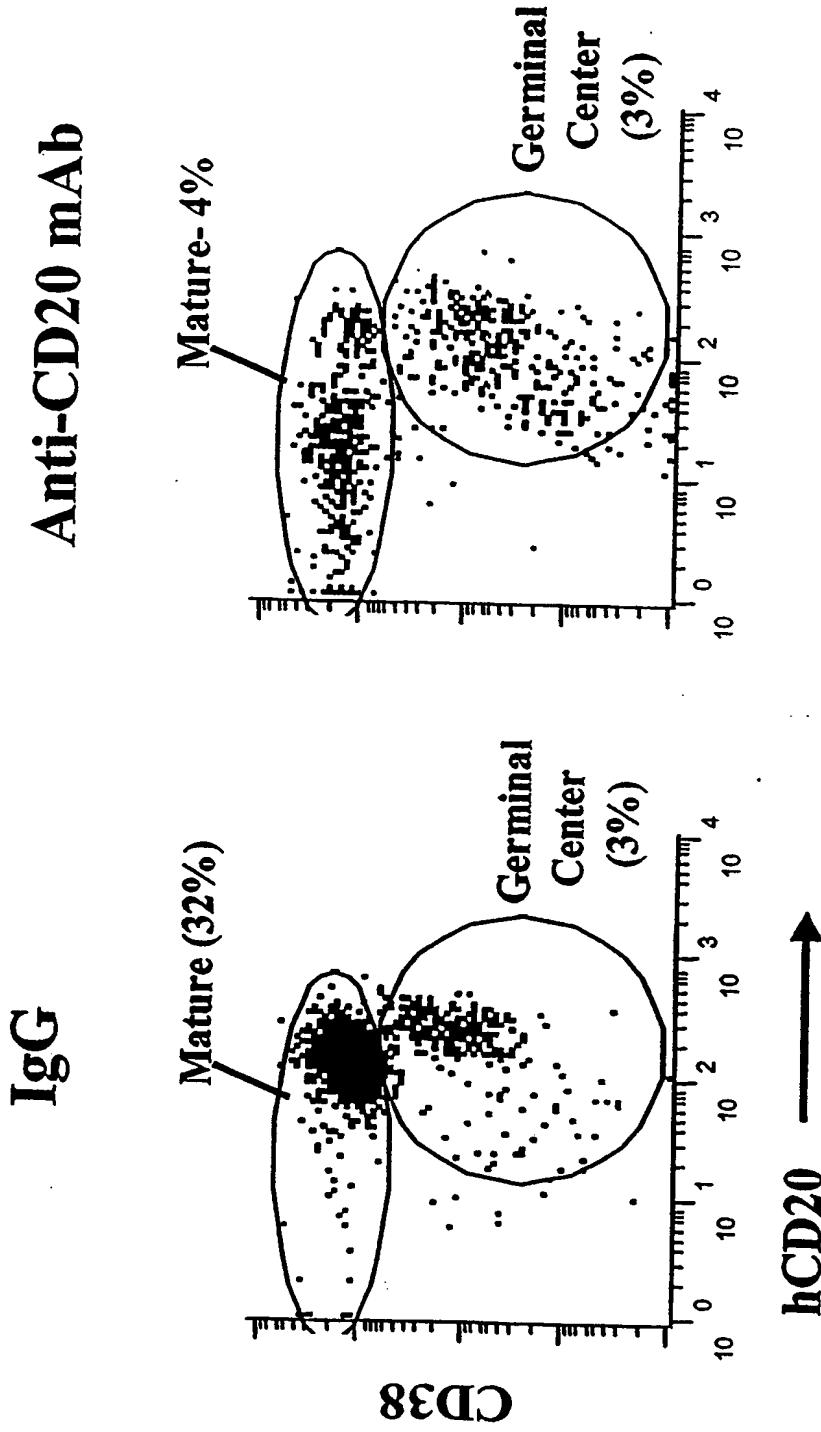
Depletion & Recovery of B cells following anti-CD20 mAb Rx
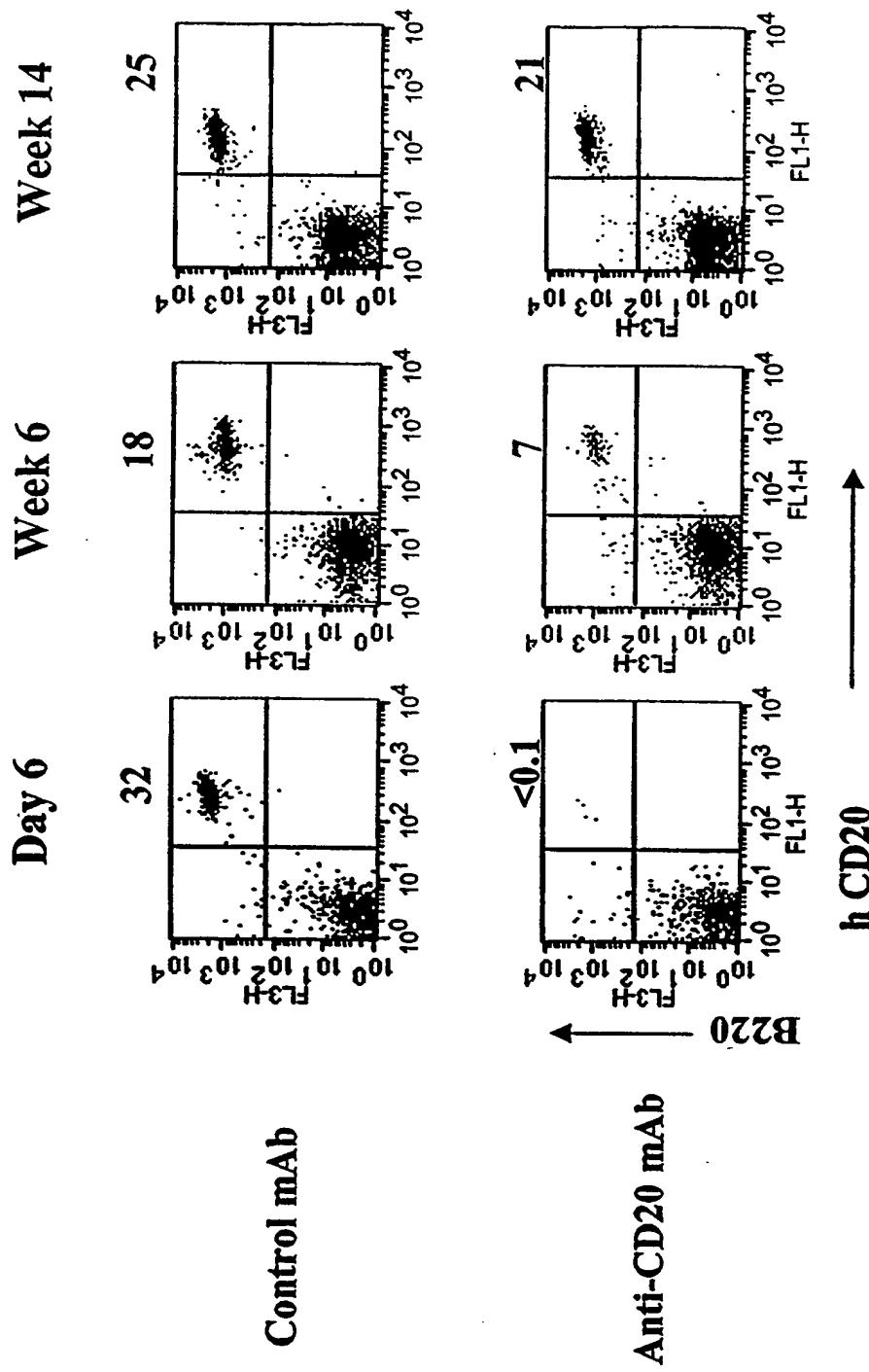
Figure 13

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 14 of 42

10/537963

Resistance of Splenic Germinal Center B cells
to short-term anti-CD20 mAb Rx

Figure 14

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 15 of 42
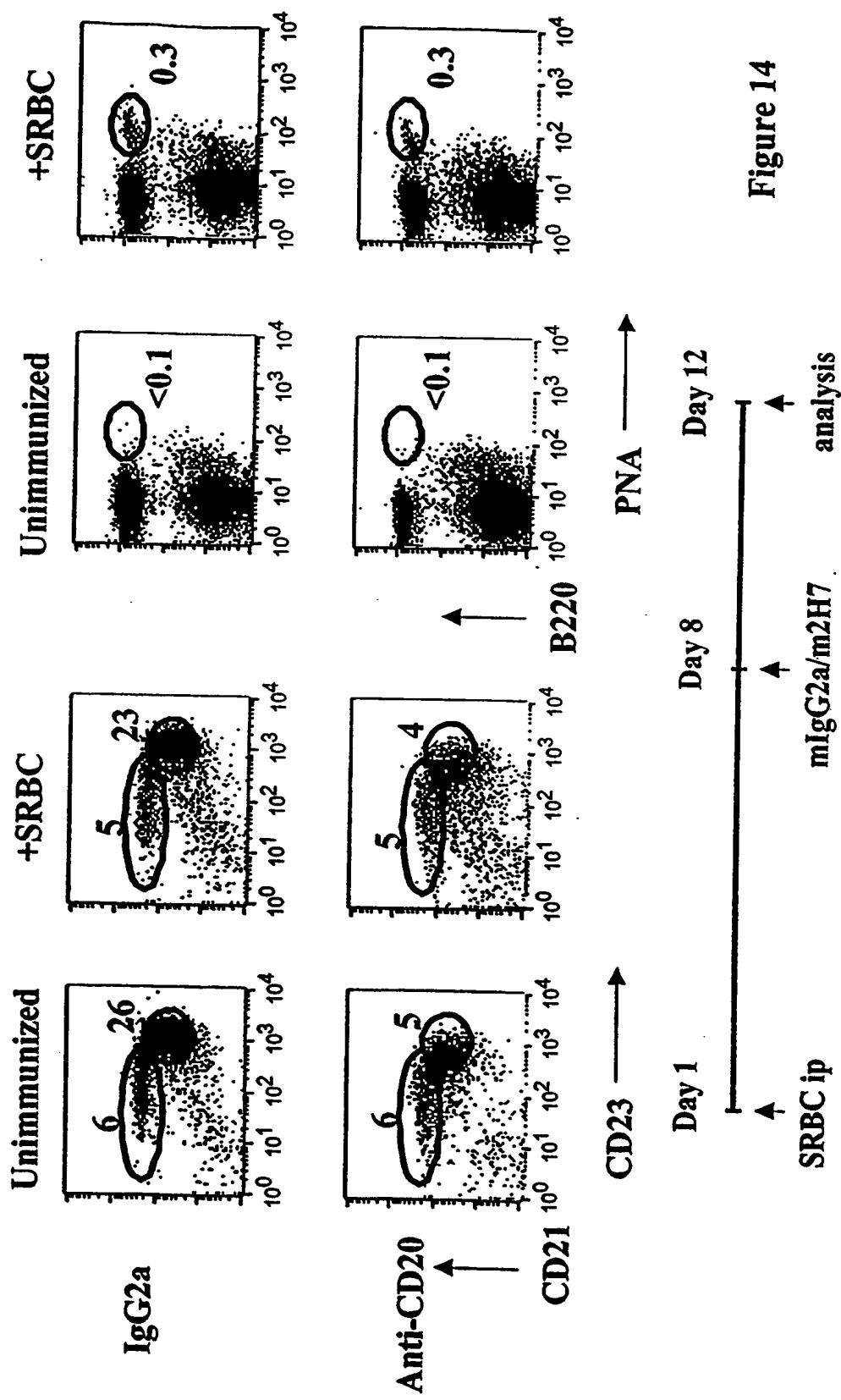
Non-depleted MZ and B1 B cells confer protection to T- Independent antigens

Figure 15
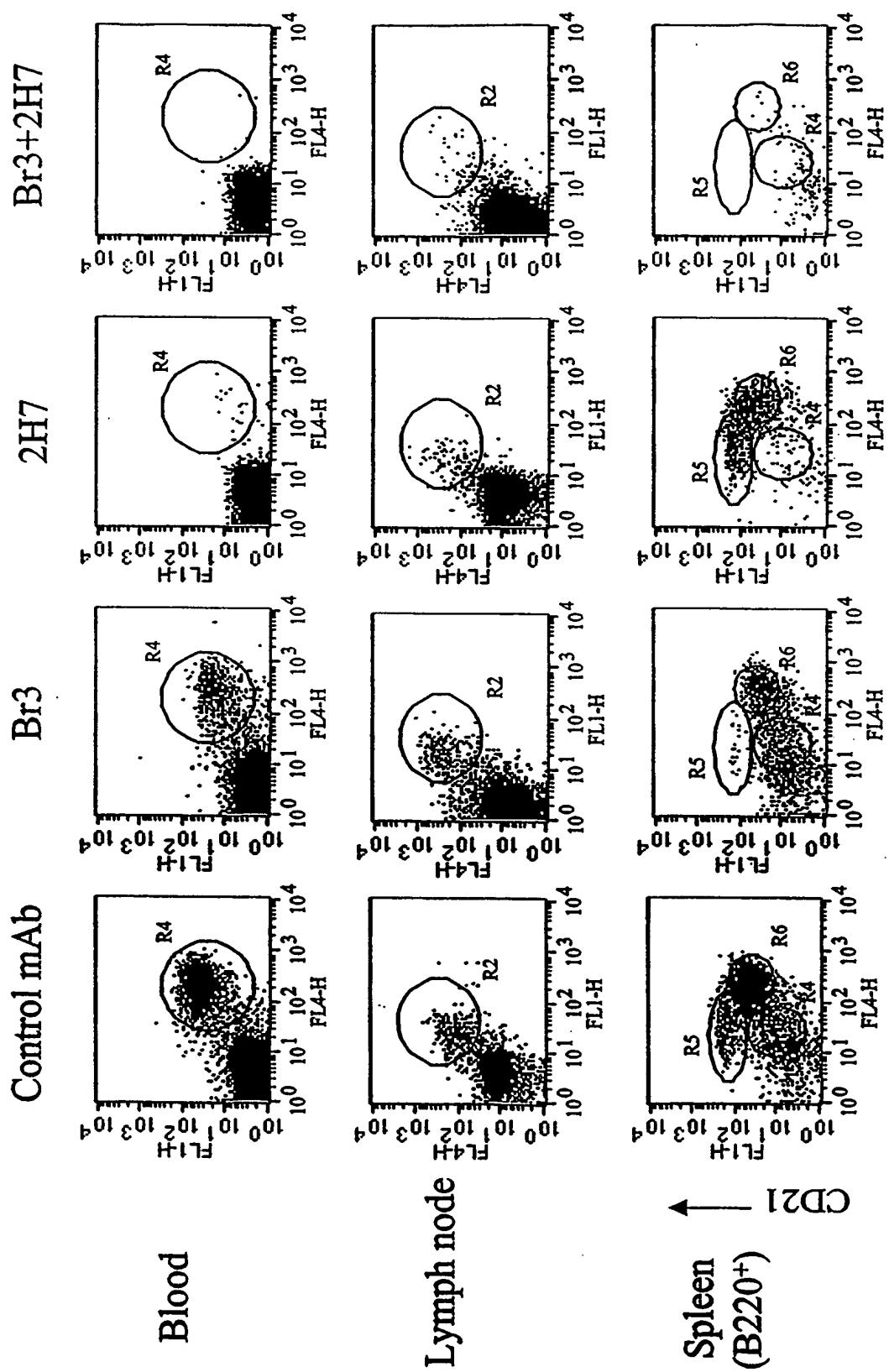
Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 16 of 42

10/537963

Figure 16

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 17 of 42

10,537963

In Peyer's Patches

Figure 17

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 18 of 42

10/537963
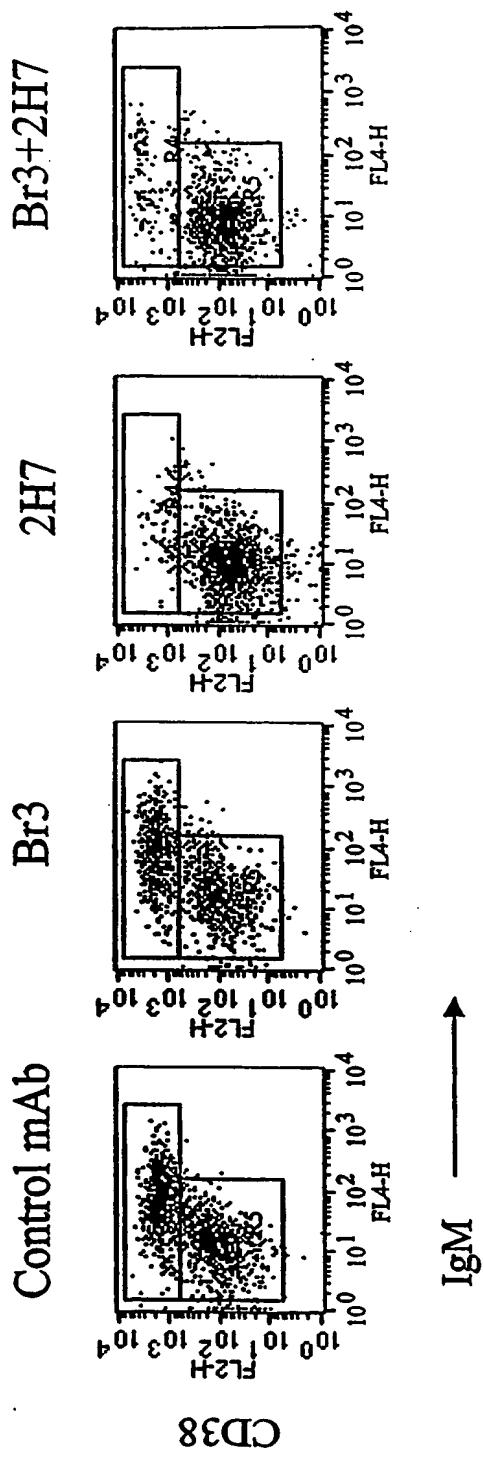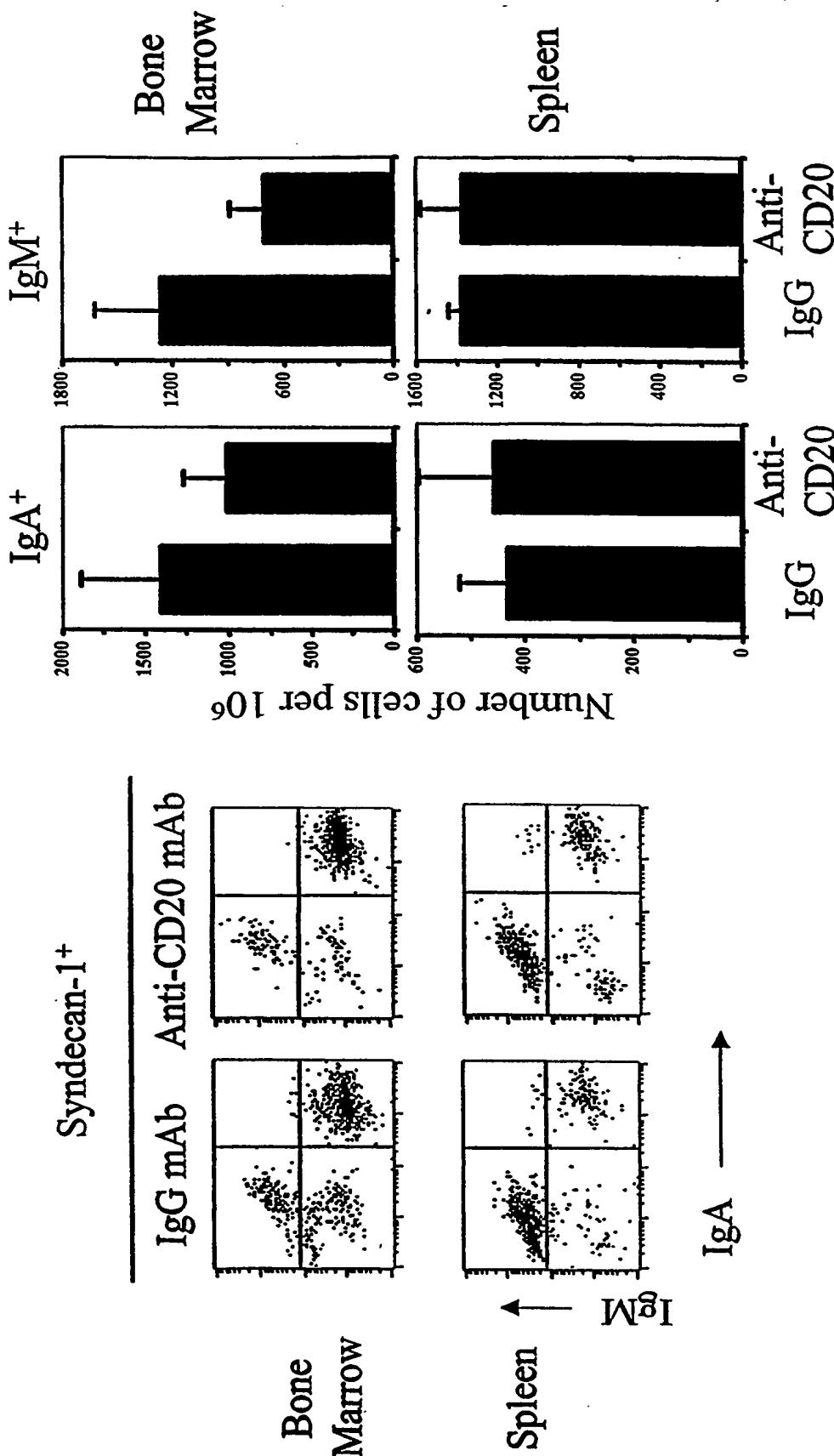
Plasma cells are not depleted
following long-term anti-CD20 mAb treatment

Figure 18

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 19 of 42

10/537963

Figure 19

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 20 of 42
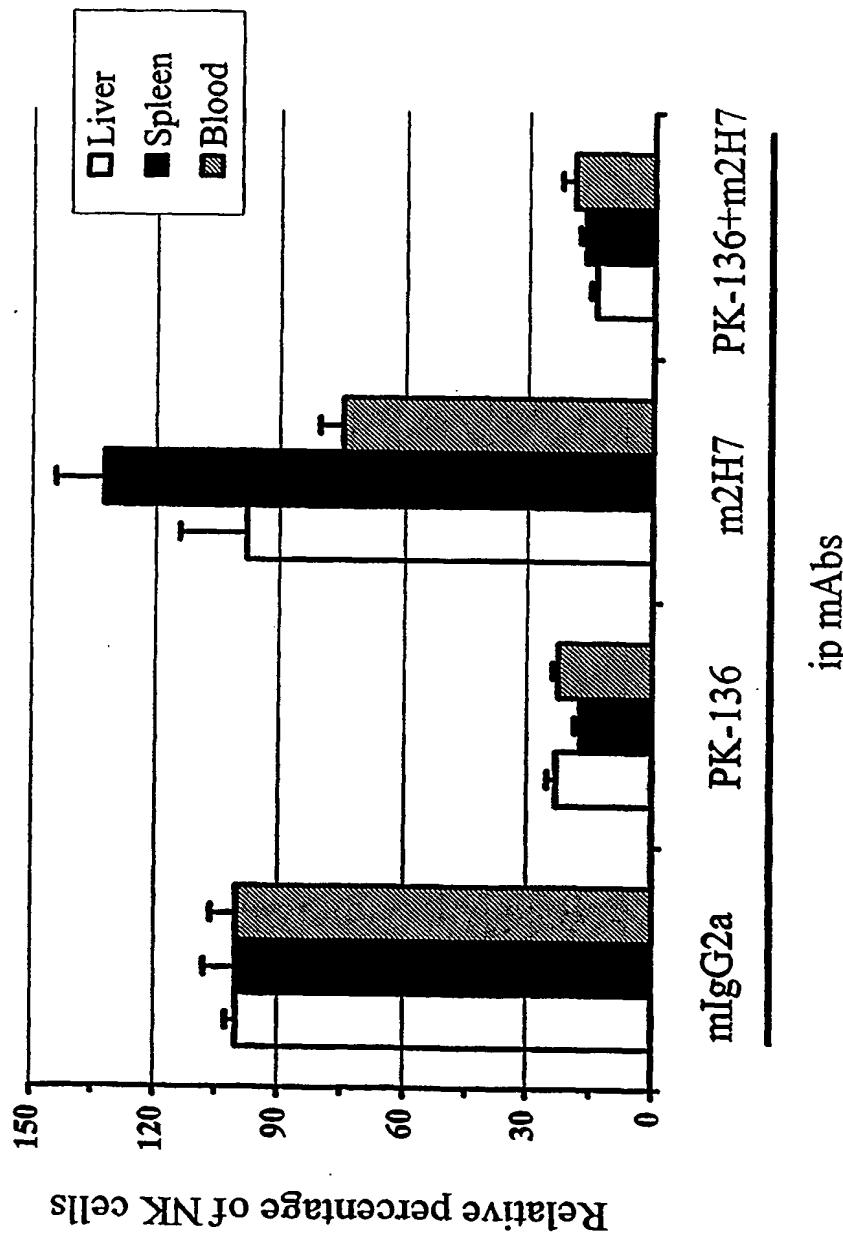
10/537963

NK cells play a role in 2H7-mediated B cell depletion

Figure 20

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 21 of 42

10/537963
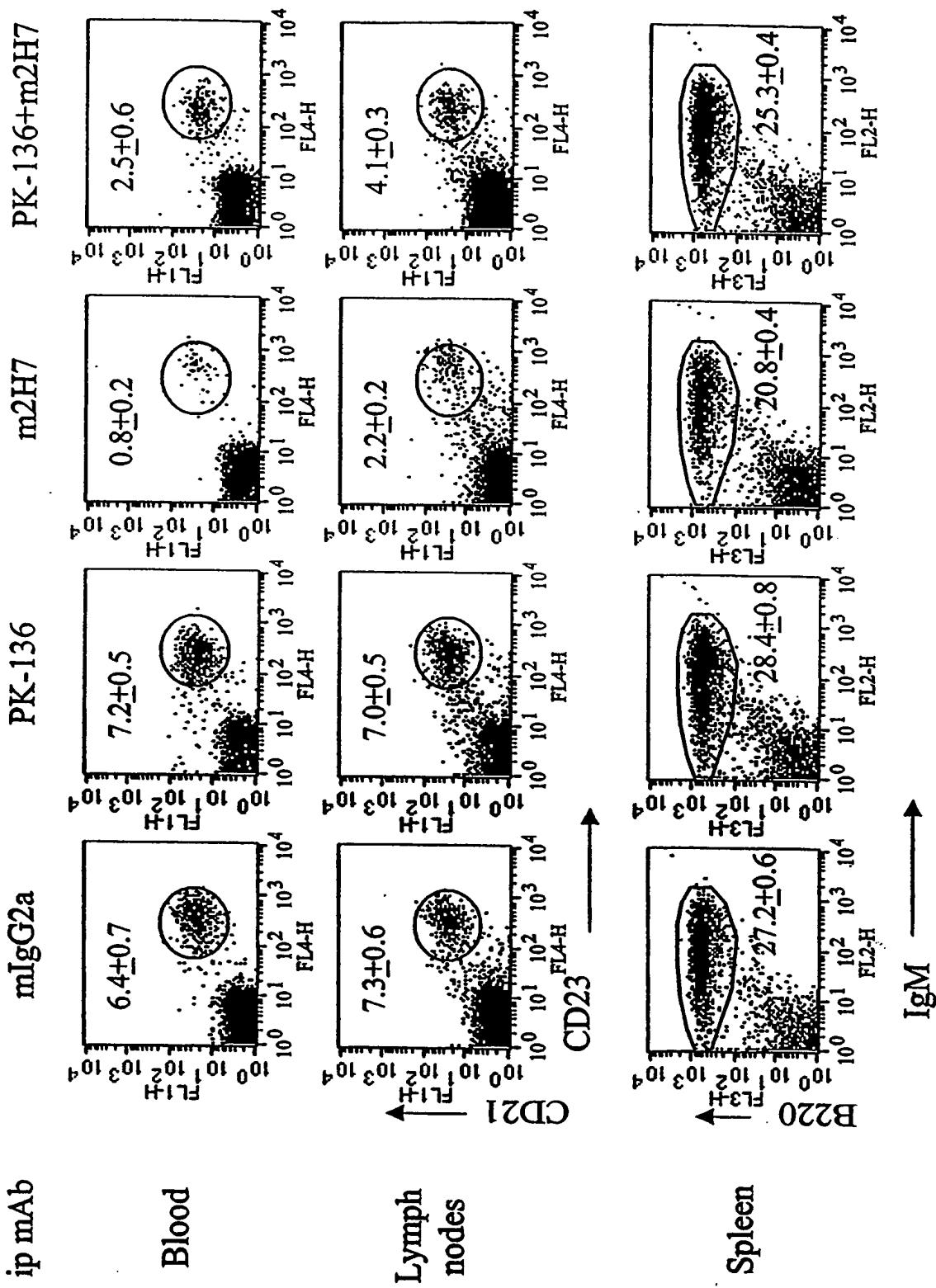
FIGURE 21

Expression of Human CD20 and CD16 Transgenes

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 22 of 42
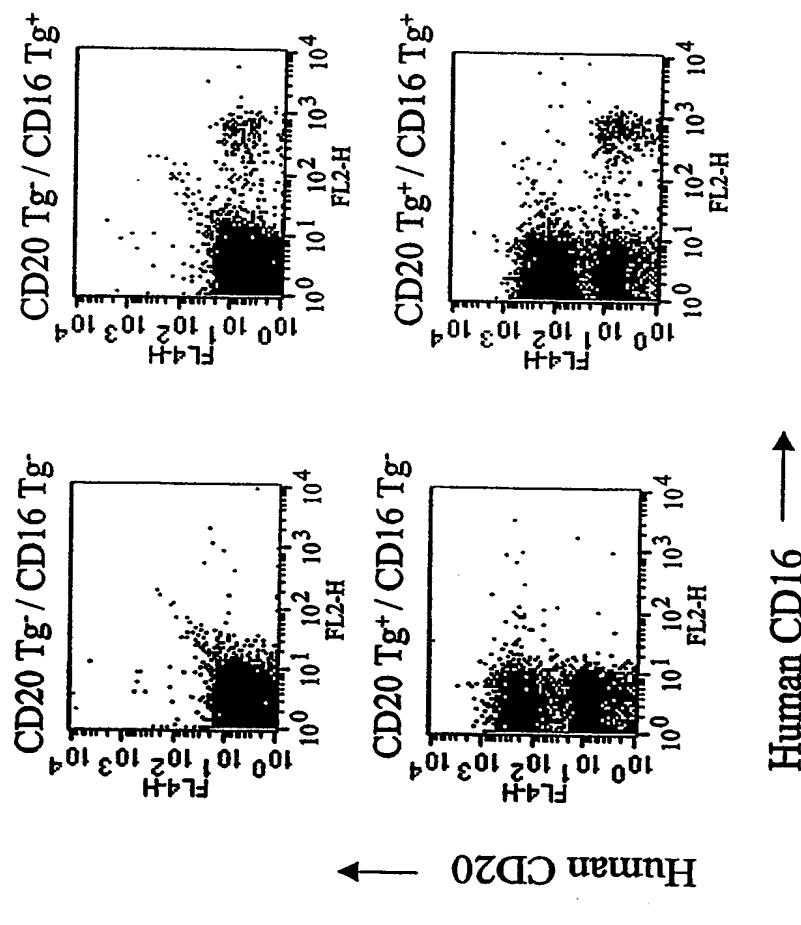
10/537963

FIGURE 22A

MGGGAGERLFTSSCLVGLVPLGLRISLVTCPLQCGIMWQLLLPT
ALLLLVSAGMRTEDLPKAVVFLEPQWYRVLEKDSVTLKCQGAYS
PEDNSTQWFHNESL ISSQASSYFIDAATVDDSGEYRCQTNLSTL
SDPVQLEVHIGWLLLQAPRWVFKEEDPIHLRCHSWKNTALHKVT
YLQNGKGRKYFHHNSDFYIPKATLKDSGSYFCRGLVGSKNVSSE
TVNITITQGLAVSTISSFFPPGYQVSFCLVMVLLFAVDTGLYFSVKT
NIRSSTRDWKDHKFKWRKDPQDK

Inventor: CHAN et al.
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Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 23 of 42

10/537963

FIGURE 22B

```
   1 gattctgtgt gtgtcctcag atgctcagcc acagaccttt gagggagtaa aggggggcaga
  61 cccacccacc ttgcctccag gctctttcct tcctggtcct gttctatggt ggggctccct
 121 tgccagactt cagactgaga agtcagatga agtttcaaga aaaggaaatt ggtgggtgac
 181 agagatgggt ggaggggctg gggaaaggct gtttacttcc tcctgtctag tcggtttggt
 241 ccctttaggg ctccggatat ctttggtgac ttgtcctctc cagtgtggca tcatgtggca
 301 gctgctcctc ccaactgctc tgctacttct agtttcagct ggcatgcgga ctgaagatct
 361 cccaaaggct gtggtgttcc tggagcctca atggtacagg gtgctcgaga aggacagtgt
 421 gactctgaag tgccagggag cctactcccc tgaggacaat tccacacagt ggtttcacaa
 481 tgagagcctc atctcaagcc aggcctcgag ctacttcatt gacgctgcca cagtcgacga
 541 cagtggagag tacaggtgcc agacaaacct ctccaccctc agtgacccgg tgcagctaga
 601 agtccatatc ggctggctgt tgctccaggc ccctcggtgg gtgttcaagg aggaagaccc
 661 tattcacctg aggtgtcaca gctggaagaa cactgctctg cataaggtca catatttaca
 721 gaatggcaaa ggcaggaagt attttcatca taattctgac ttctacattc caaaagccac
 781 actcaaagac agcggctcct acttctgcag ggggcttgtt gggagtaaaa atgtgtcttc
 841 agagactgtg aacatcacca tcactcaagg tttggcagtg tcaaccatct catcattctt
 901 tccacctggg taccaagtct ctttctgctt ggtgatggta ctccttttg cagtggacac
 961 aggactatat ttctctgtga agacaaacat tcgaagctca acaagagact ggaaggacca
1021 taaatttaaa tggagaaagg accctcaaga caaatgaccc ccatcccatg ggggtaataa
1081 gagcagtagc agcagcatct ctgaacattt ctctggattt gcaaccctat catcctcagg
1141 cctctctaca agcagcagga aacatagaac tcagagccag atcccttatc caactctcga
1201 cttttccttg gtctccagtg gaagggaaaa gcccatgatc ttcaagcagg gaagcccag
1261 tgagtagctg cattcctaga aattgaagtt tcagagctac acaaacactt tttctgtccc
1321 aaccgttccc tcacagcaaa gcaacaatac aggctaggga tggtaatcct ttaaacatac
1381 aaaaattgct cgtgttataa attacccagt ttagaggggga aaaaaaaaca attattccta
1441 aataaatgga taagtagaat taatggttga ggcaggacca tacagagtgt gggaactgct
1501 ggggatctag ggaattcagt gggaccaatg aaagcatggc tgagaaatag caggtagtcc
1561 aggatagtct aagggaggtg ttcccatctg agcccagaga taagggtgtc ttcctagaac
1621 attagccgta gtggaattaa caggaaatca tgagggtgac gtagaattga gtcttccagg
1681 ggactctatc agaactggac catctccaag tatataacga tgagtcctct taatgctagg
1741 agtagaaaat ggtcctagga aggggactga ggattgcggt ggggggtggg gtggaaaaga
1801 aagtacagaa caaaccctgt gtcactgtcc caagttgcta agtgaacaga actatctcag
1861 catcagaatg agaaagcctg agaagaaaga accaaccaca agcacacagg aaggaaagcg
1921 caggaggtga aaatgctttc ttggccaggg tagtaagaat tagaggttaa tgcagggact
1981 gtaaaaccac cttttctgct tcaatatcta attcctgtgt agctttgttc attgcattta
2041 ttaaacaaat gttgtataac caatactaaa tgtactactg agcttcgctg agttaagtta
```

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Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 24 of 42

FIGURE 22B
(CONT'D)

2101 tgaaactttc aaatccttca tcatgtcagt tccaatgagg tggggatgga gaagacaatt

2161 gttgcttatg aaagaaagct ttagctgtct ctgttttgta agctttaagc gcaacatttc

2221 ttggttccaa taaagcattt tacaagatct tgcatgctac tcttagatag aagatgggaa

2281 aaccatggta ataaaatatg aatgataaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa

2341 a

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 25 of 42

FIGURE 22C

1 aagcttccca tcctgttgca gtcccttact ctcctcctgt gctctctcct cttcttccta

61 tctagcccac ccttttggta gctaagaatt cctccctcca ttggagagcc acagaccaaa

121 gaggagtcaa ataagaaaat aagacctcaa agaaggaaaa caaagtgaag gccttgcatc

181 agaagtcacg tggcagaaag ccacctggat atctgaaaag aagaaagaat tgagggatat

241 ccgctttttg cctcagagac catccttagc cctgaaggct ttgtttctgc tttaggtttc

301 ccagataagc atccgaagtg ctacagcaag gaactttaag tttccagata cttgtctgga

361 tttttgcaagg cgtagatgag tcacttgaga aggagaactg gaatggctgc ctaggttcat

421 ttccattgtg caatccaagg gcctgtggag aaggggctgc tgcaagactc tgtgtgtggc

481 gggggggaggg gtgggtacgt ggatggcaat gggaggatca attaactcca cccaggagcc

541 aaatgaaaca cacaaataaa aaacaaaacc tgagtagtgg tttttaggtc attctggagt

601 agaaagagca ttcatttata gcaaaggttg gcgggcacct gtgtcagccc ctgcctccac

661 tccacccccta acaagtatca ggtgcccaca cgggcctgct gctcgcctcc tgggcttttc

721 taagccaggt gagacctgtc ccagatgtcc acgaatccac tgggggagtg gcactatcaa

781 gcagagtcat ctgatttttct gcctgggacc tggaccattg tgagagtaac caacgtgggg

841 ttacggggga gaatctggag agaagagaag aggttaacaa ccctcccact tcctggccac

901 cccccctccac cttttctggt aaggagccct ggagccccgg ctcctaggct gacagaccag

961 cccagatcca gtggcccgga ggggcctgag ctaaatccgc aggacctggg taacacgagg

1021 aaggtaaaga gttcctgtcc tcgcccctcc ccacccccac cttttctgtg atcttttcag

1081 cctttcgctg gtgacttgtt cttccagggc ccatttctct accctacctg ggtttcttct

1141 aacctggaaa tctaatgatc aaatcacact aaaaagtcag tagctcctgt ggattacata

1201 tcccaggagc atatagattt tgaatttga attttgaaag aaattctgcg tggagataat

1261 attgaggcag agacactgct agtggtctga agatttgaaa ggaccactt ctgtgtgcag

1321 gcagggcctc agctggagat agatgggtct gggcgaggca ggagagtgac aagttctgag

1381 gtgaaatgaa ggaagccctc agagaatgct cctcccacct tgaatctcat ccccagggtc

1441 tcactgtccc attcttggtg ctgggtggat ccaaatccag gagatggggc aagcatcctg

1501 ggatggctga gggcacactc tggcagattc tgtgtgtgtc ctcagatgct cagccacaga

1561 cctttgaggg agtaaagggg gcagacccac ccaccttgcc tccaggctct ttccttcctg

1621 gtcctgttct atggtggggc tcccttgcca gacttcagac tgagaagtca gatgaagttt

1681 caagaaaagg aaattggtgg gtgacagaga tgggtggagg ggctggggaa aggctgttta

1741 cttcctcctg tctagtcggt ttggtcccott tagggctccg gatatctttg gtgacttgtc

1801 cactccagtg tggcatcatg tggcagctgc tcctcccaac tgctctgcta cttctaggta

1861 agtcagggtc tccctggttg agggagaagt ttgagatgcc ttgggttcag cagagacccc

1921 ttttcaggct acgaatgaga ctcccacgaa gggatgggac ccctcaccac atctatagct

1981 gtggattgag ctcctaggac aagccaagat ggggctagaa atgaggagaa tgctggttcc

2041 aattgggggca tactcatgag tgaggccagt cacttcaccc ctctgggtcc cagaatcact

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 26 of 42

10/537963

FIGURE 22C
(CONT'D)

2101 ctgtggaacc aaagagcttc gactagatgg tccctagggt ctgtctcttt cagtttgaca

2161 ttccagggtt ctcctctatg attttcaatt tctacccttt cttgtgggga tatgggttga

2221 ggctctttct gtagcttggt tcagggaaat tcaacctgta cccttaattt gtgagtttgc

2281 acagggagca aggggtaagg gagcagtgtt gaaaataggg atttgtgttg acagtggcgc

2341 aagaggcatg aacagtggag accagagagc aggtagcaag gtttccacca gaaacatcct

2401 gattcttggg aaaattgggc tcctggggca gaggagggca ggggagtttt aaactcactc

2461 tatgttctaa tcactctgat ctctgcccct actcaatatt tgatttactc ttttttcttg

2521 cagtttcagc tggcatgcgg actggtgagt cagcttcatg gtcttggatt gacccagtgg

2581 ggcacatatg gggacaaagg ccataagata ttgggaaatg cttgttgaat gggaaaatgc

2641 tgatgtgggg ttagcaggga tagttcctcc aacacagcag aacttggccc tgtgcttctc

2701 tggccagctt tccttaagat actgaacagg ccaaaaatgg ggccaagatg ctctaagact

2761 gagccaccaa gcatgggttt gcaatgagct cattctggct ttgaggctcc ctgggaatgg

2821 cagtgtagag cctgctcctc tccctgtcct caccccacat tatcttggct cctcagaaga

2881 tctcccaaag gctgtggtgt tcctggagcc tcaatggtac agggtgctcg ag

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 27 of 42

10/537963

Figure 22D
Mouse CD16 alpha chain

```
   1 gtagttcatc tcctgaacct catcagactc tgatccagtt cttgaatgac tttggacacc
  61 cagatgtttc agaatgcaca ctctggaagc caatggctac ttccaccact gacaattctg
 121 ctgctgtttg cttttgcaga caggcagagt gcagctcttc cgaaggctgt ggtgaaactg
 181 gacccccat ggatccaggt gctcaaggaa gacatggtga cactgatgtg cgaagggacc
 241 cacaaccctg ggaactcttc tacccagtgg ttccacaacg ggaggtccat ccggagccag
 301 gtccaagcca gttacacgtt taaggccaca gtcaatgaca gtggagaata tcggtgtcaa
 361 atggagcaga cccgcctcag cgaccctgta gatctgggag tgatttctga ctggctgctg
 421 ctccagaccc ctcagcgggt gtttctggaa ggggaaacca tcacgctaag gtgccatagc
 481 tggaggaaca aactactgaa caggatctca ttcttccata atgaaaaatc cgtgaggtat
 541 catcactaca aaagtaattt ctctatccca aaagccaacc acagtcacag tggggactac
 601 tactgcaaag gaagtctagg aagtacacag caccagtcca gcctgtcac catcactgtc
 661 caagatccag caactacatc ctccatctct ctagtctggt accacactgc tttctcccta
 721 gtgatgtgcc tcctgtttgc agtggacacg ggcctttatt tctacgtacg gagaaatctt
 781 caaaccccga gggagtactg gaggaagtcc ctgtcaatca gaaagcacca ggctcctcaa
 841 gacaagtgac accccatcca tcctatggca aaacatacga tgtttggtg gcagcagcaa
 901 cttttcagcc acacagcctt cctttgaaag caacttacaa gcaggccggg atgtttggtt
 961 cttcaatcac aacgacttag gatcaccagt tcaaggcttg ctgggtcaca cagagagagt
1021 gagtgcaagt ctagcctgga taacccagtg agatcctggg tttaggcggc tcatcaggaa
1081 agagaacctg ttgctaatct cacaaacaag atgcctactg cccatgtggc caaaggagag
1141 aacaaggtcc tggaagttgt cctctgacct ccaccatcca ccatggcagg tgcacacaat
1201 aaattaaaat gtcatgtata tttttaaaca agagacaggg gcaggctaag ggttgatggc
1261 atagctgtta tccagtacac ataatgccct gggtttgacc tcctataata aagc
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Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 28 of 42

10/537963

Figure 22E
CD16 alpha chain-B

MWQLLLPTALLLLVSAGMRTEDLPKAVVFLEPQWYSVLEKDSVT
LKCQGAYSPEDNSTQWFHNESLISSQASSYFIDAATVNDSGEYR
CQTNLSTLSDPVQLEVHIGWLLLQAPRWVFKEEDPIHLRCHSWK
NTALHKVTYLQNGKDRKYFHHNSDFHIPKATLKDSGSYFCRGLV
GSKNVSSETVNITITQGLAVSTISSFSPPGYQVSFCLVMVLLFAVD
TGLYFSVKTN

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  1 tctttggtga cttgtccact ccagtgtggc atcatgtggc agctgctcct cccaactgct
 61 ctgctacttc tagtttcagc tggcatgcgg actgaagatc tcccaaaggc tgtggtgttc
121 ctggagcctc aatggtacag cgtgcttgag aaggacagtg tgactctgaa gtgccaggga
181 gcctactccc ctgaggacaa ttccacacag tggtttcaca atgagagcct catctcaagc
241 caggcctcga gctacttcat tgacgctgcc acagtcaacg acagtggaga gtacaggtgc
301 cagacaaacc tctccaccct cagtgacccg gtgcagctag aagtccatat cggctggctg
361 ttgctccagg cccctcggtg ggtgttcaag gaggaagacc ctattcacct gaggtgtcac
421 agctggaaga acactgctct gcataaggtc acatatttac agaatggcaa agacaggaag
481 tattttcatc ataattctga cttccacatt ccaaaagcca cactcaaaga tagcggctcc
541 tacttctgca ggggcttgt tgggagtaaa aatgtgtctt cagagactgt gaacatcacc
601 atcactcaag gtttggcagt gtcaaccatc tcatcattct ctccacctgg gtaccaagtc
661 tctttctgct tggtgatggt actcctttt gcagtggaca caggactata tttctctgtg
721 aagacaaaca tttgaagctc aacaagagac tggaaggacc ataaacttaa atggagaaag
781 gaccctcaag acaaatgacc cccatcccat gggagtaata agagcagtgg cagcagcatc
841 tctgaacatt tctctggatt tgcaacccca tcatcctcag gcctctc
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Docket No.: 11669.0150USW1
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Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 29 of 42

10/537963

Figure 22F

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   1 aagcttccca tcctgttgca gtcccttact ctcctcctgt gctctctcct cttcttccta

  61 tctagcccac ccttttggta gctaagaatt cctccctcca ttggagagtc acagaccaaa

 121 gaggagtcaa ataagaaaat aagacctcaa agaaggaaaa caaagtgaag gccttgcatc

 181 agaagtcacg tggcagaaag ccacctggat atctgaaaag aagaaagaat tgagggatat

 241 ccgctttttg cctcagagac catccttagc cctgaaggct ttgtttctgc tttaggtttc

 301 ccagatgagc atctgaagtg ctacagcaag gaacttcaag tttccagata cttgtctgga

 361 ttttgcaagg cgtagatgag tcacttgaga aggagaactg gaatggcggc ctgggttcat

 421 ttccgttgtg caatccaagg gcctgtggag aaggggctgc tgcaagactc tgtgtgtggc

 481 aggggaggg gtgggtacgt ggatggcaat gggaggatca attaactcca cccaggagcc

 541 aaatgaaaca cacaaataaa aaacaaaacc tgagtagtgg tttttaggtc attctggagt

 601 agaaagagca ttcatttata gcaaaggttg gcgggcacct gtgtcagccc ctgcctccac

 661 tccacccta acaagtatca ggtgcccaca cgggcctgct gctcgcctcc tgggcttttc

 721 taagccaagt gagacctgtc ccagatgtcc acgaatccac tgggggagtg gcactatcaa

 781 gcagagtcat ctgattttct gcctgggacc tggaccattg tgagagtaac caacatgggg

 841 ttacggggga gaatctggag agaagagaag aggttaacaa ccctcccact tcctggccac

 901 cccctccac cttttctggt aaggagccct ggagccctgg agccctggct cctaggctga

 961 cagaccagcc cagatccagt ggcccggagg ggcctgagct aaatccgcag gacctgggta

1021 acacgaggaa ggtaaagagt tcctgtcctc acccctcccc accccacct tttctgtgat

1081 cttttcagcc tttcactggt gacttgttct tccagggccc atttctctac cctacctggg

1141 tttcttctaa cctggaaatc taatgatcaa atcacactaa aaagtcagct cctgtggatt

1201 acatatccca ggagcatata gattttgaat tttgaatttt gaaagaaatt ctgcgtggag

1261 ataatattga ggcagagaca ctgctagtgg tcaaagattt gaaaggacaa ctttctgtgt

1321 gcaggcaggg cctcggctgg agatagatgg gtctggacga ggcaggagag tgagaagttc

1381 tgaggtgaaa tgcaggaagc cctcagagaa tgctcctccc accttgaatc tcatccccag

1441 ggtcttgctg tcccattctt ggtgctgggt ggatctaaat ccaggagatg ggggcaagca

1501 tctgggaaag ctgagggcac actctggcag attctgtgtg tgtcctcaga tgctcagccg

1561 cagacctttg ggggagtaaa gggggcacac ccacccacct tgcctccagg ctctttcctt

1621 cctattcctg ttctatggtg gggctccatt gcgagacttc agattgagaa atcagatgaa

1681 gtttcaagaa aaggaaactg gcaggtgaca gagatgggtg gagggactgg ggaaaggctg

1741 tttactccct cctgtctagt cggcttggtc cctttagggc tccggatatc tttggtgact

1801 tgtccactcc agtgtggcat catgtggcag ctgctcctcc caactgctct gctacttcta

1861 ggtaagtcag gatatccctg gttgagggag aagtttgaga tgccttgggt tcatcagaga

1921 ccccttttca ggctacgaat gagactccca caaagggatg ggacccctca ccacatctat

1981 agctgtggat tgagctacca ggacaagcca agatggggct agaaatgagg agaatgctgg

2041 ttccaattgg gtcatagtca tgagtgaggc cagtcacttc acccctctgg gtcccagaat
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Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 30 of 42

10/537963

FIGURE 22F
(CONT'D)

2101 cactatgtgg aactgaagag cttcgactag atggtcccta gggtctgtct ctttcagttt

2161 gacattccag ggttctcctc tatggttttt aatttctacc ctttcttgtg gggatatggg

2221 ttgaggctgt ttctgtggct tggtttaggg aaattcaacc tgtaccctta atttgtgagt

2281 ttgcacaggg agcaaggggt aagggagcag tgttgaaaat agggatttgt gttgacagtg

2341 gcgcaagagg catgaacagt agagaccaga gagcaggtag caaggtttcc accagaaaca

2401 tcctgattct tgggaaaatt gggctcctgg ggcagaggag ggcaggggag ttttaaactc

2461 actctatgtt ctaatcactc tgatctctgc ccccactcaa tatttgattt actctttttt

2521 cttgcagttt cagctggcat gcggactggt gagtcagctt catggtcttg gattgaccca

2581 gtggggcaca tatggggaca atggccataa gatattggga aatgcttgtt gaatgggaaa

2641 atgctgatgt ggggttagca gggatagttc ctccaacaca gcagaacttg gccctgtgct

2701 tctctggcca gctttcctta agatactgaa caggccaaaa atggggccaa gatgctctaa

2761 gactgagcca ccaagcatgg gtttgcaatg agctcattct ggctttgagg ctccctggga

2821 atggcagtgt agagcctgct cctctccctg tcctcacccc acattatctt ggctcctcag

2881 aagatctccc aaaggctgtg gtgttcctgg agcctcaatg gtacagcgtg cttgagaagg

2941 acagtgtgac tctgaagtgc cagggagcct actcccctga ggacaattcc acacagtggt

3001 ttcacaatga gagcctcatc tcaagccagg cctcgag

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 31 of 42

10/537963

Figure 22G
Murine FcgammaRIII

```
   1 gtagttcatc tcctgaacct catcagactc tgatccagtt cttgaatgac tttggacacc
  61 cagatgtttc agaatgcaca ctctggaagc caatggctac ttccaccact gacaattctg
 121 ctgctgtttg cttttgcaga caggcagagt gcagctcttc cgaaggctgt ggtgaaactg
 181 gacccccat ggatccaggt gctcaaggaa gacatggtga cactgatgtg cgaagggacc
 241 cacaaccctg ggaactcttc tacccagtgg ttccacaacg ggaggtccat ccggagccag
 301 gtccaagcca gttacacgtt taaggccaca gtcaatgaca gtggagaata tcggtgtcaa
 361 atggagcaga cccgcctcag cgaccctgta gatctgggag tgatttctga ctggctgctg
 421 ctccagaccc ctcagcgggt gtttctggaa ggggaaacca tcacgctaag gtgccatagc
 481 tggaggaaca aactactgaa caggatctca ttcttccata tgaaaaatc cgtgaggtat
 541 catcactaca aaagtaattt ctctatccca aaagccaacc acagtcacag tggggactac
 601 tactgcaaag gaagtctagg aagtacacag caccagtcca agcctgtcac catcactgtc
 661 caagatccag caactacatc ctccatctct ctagtctggt accacactgc tttctcccta
 721 gtgatgtgcc tcctgtttgc agtggacacg ggcctttatt tctacgtacg gagaaatctt
 781 caaaccccga gggagtactg gaggaagtcc ctgtcaatca gaaagcacca ggctcctcaa
 841 gacaagtgac accccatcca tcctatggca aaacatacga tgttttggtg gcagcagcaa
 901 cttttcagcc acacagcctt cctttgaaag caacttacaa gcaggccggg atgtttggtt
 961 cttcaatcac aacgacttag gatcaccagt tcaaggcttg ctgggtcaca cagagagagt
1021 gagtgcaagt ctagcctgga taacccagtg agatcctggg tttaggcggc tcatcaggaa
1081 agagaacctg ttgctaatct cacaaacaag atgcctactg cccatgtggc caaaggagag
1141 aacaaggtcc tggaagttgt cctctgacct ccaccatcca ccatggcagg tgcacacaat
1201 aaattaaaat gtcatgtata tttttaaaca agagacaggg gcaggctaag ggttgatggc
1261 atagctgtta tccagtacac ataatgccct gggtttgacc tcctataata aagc
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Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 32 of 42

10/537963

FIGURE 23A

MTTPRNSVNGTFPAEPMKGPIAMQSGPKPLFRRMSSLVGPTQSF
FMRESKTLGAVQIMNGLFHIALGGLLMIPAGIYAPICVTVWYPLWGGIMYIISGSLLA
ATEKNSRKCLVKGKMIMNSLSLFAAISGMILSIMDILNIKISHFLKMESLNFIRAHTP
YINIYNCEPANPSEKNSPSTQYCYSIQSLFLGILSVMLIFAFFQELVIAGIVENEWKR
TCSRPKSNIVLLSAEEKKEQTIEIKEEVVGLTETSSQPKNEEDIEIIPIQEEEEEETE
TNFPEPPQDQESSPIENDSSP"

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 33 of 42

10/537963

FIGURE 23B

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   1 agtgtgcttg agaaacaaac tgcacccact gaactccgca gctagcatcc aaatcagccc
  61 ttgagatttg aggccttgga gactcaggag ttttgagagc aaaatgacaa cacccagaaa
 121 ttcagtaaat gggactttcc cggcagagcc aatgaaaggc cctattgcta tgcaatctgg
 181 tccaaaacca ctcttcagga ggatgtcttc actggtgggc cccacgcaaa gcttcttcat
 241 gagggaatct aagactttgg gggctgtcca gattatgaat gggctcttcc acattgccct
 301 ggggggtctt ctgatgatcc cagcagggat ctatgcaccc atctgtgtga ctgtgtggta
 361 ccctctctgg ggaggcatta tgtatattat ttccggatca ctcctggcag caacggagaa
 421 aaactccagg aagtgtttgg tcaaaggaaa aatgataatg aattcattga gcctctttgc
 481 tgccatttct ggaatgattc tttcaatcat ggacatactt aatattaaaa tttcccattt
 541 tttaaaaatg gagagtctga attttattag agctcacaca ccatatatta acatatacaa
 601 ctgtgaacca gctaatccct ctgagaaaaa ctccccatct acccaatact gttacagcat
 661 acaatctctg ttcttgggca ttttgtcagt gatgctgatc tttgccttct tccaggaact
 721 tgtaatagct ggcatcgttg agaatgaatg gaaaagaacg tgctccagac ccaaatctaa
 781 catagttctc ctgtcagcag aagaaaaaaa agaacagact attgaaataa aagaagaagt
 841 ggttgggcta actgaaacat cttcccaacc aaagaatgaa gaagacattg aaattattcc
 901 aatccaagaa gaggaagaag aagaaacaga gacgaacttt ccagaacctc cccaagatca
 961 ggaatcctca ccaatagaaa atgacagctc tccttaagtg atttcttctg ttttctgttt
1021 cctttttttaa acattagtgt tcatagcttc caagagacat gctgactttc atttcttgag
1081 gtactctgca catacgcacc acatctctat ctggcctttg catggagtga ccatagctcc
1141 ttctctctta cattgaatgt agagaatgta gccattgtag cagcttgtgt tgtcacgctt
1201 cttcttttga gcaactttct tacactgaag aaaggcagaa tgagtgcttc agaatgtgat
1261 ttcctactaa cctgttcctt ggataggctt tttagtatag tatttttttt ttgtcatttt
1321 ctccatcagc aaccagggag actgcacctg atggaaaaga tatatgactg cttcatgaca
1381 ttcctaaact atctttttt tattccacat ttattacgttttt ggtggagtcc cttttgcatc
1441 attgttttaa ggatgataaa aaaaaaaaaa aaa
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Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 34 of 42

FIGURE 23C

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   1 tgttaaacca aagtaattgg agcgaagccc agggtagcag aagctactga tttcctgtca

  61 cctgatgtct atcagcgatt tcatcttcag gcctggacta caccactcac cctcccagtg

 121 tgcttgagaa acaaactgca cccactgaac tccgcagcta gcatccaaat cagcccttga

 181 gatttgaggc cttggagact caggtaagga atcaatttgc tttctttaaa tgacttaaag

 241 gaggtgatgg ataaggtata gaatggtttt gaagactgga ggttcttgat cttaattcta

 301 gagtttccct agtcagactt cctaatagtt ctatgactta aggaggggtg acgatatcaa

 361 ggcttgctgc ccactcactc ctctaatcag tctccctctc aacaattacc ctatgcagtc

 421 aactgtgaat cattccacaa aagtagtaga ttgcagcata tatattaaat catggtttct

 481 aaaccattgg gttcgaactg gagctctacc actaacaaac aatataacct tgggcaaatt

 541 actaacctct aagcctcagc ttcctcatcg ttaacttatt tatgtcttac atctcagaga

 601 ggggtactgt tctaacttta cagaaggata aaatcgaaac taatgctcag caaagtacaa

 661 agaacaagaa tagcaacaaa aataactatt tattccaaca tgggttcttt gcatacattt

 721 atttcttcaa taatatttat taagaagtaa ctaaatccaa aaattatttt agatcctgaa

 781 caagagagaa caaaatctct actttgatgg aacttccatt ctgtgggaa gagactgaca

 841 ataagcaatt aaataaataa ggtaatttcc tacagtgatc aatgccgtaa agcaattaag

 901 ataggatttt gtaaaagaca gcaaatagga gtacatgtta tagattgagg gttcaaggta

 961 ggctcctcta ggagctgaca tttgagctac acctgaacaa aaagacacta gccatgcaca

1021 gaccatgagc ccagttaagt gttatagcag cccacgagat aagaattatt attatttcaa

1081 ttttacagtt gaacctgagg cccagagaat ttaaagaact tgcccaacat ctcagaacaa

1141 atggaggaat cactattgaa acctgggcaa tctgactcag gaggccacag tcttatatac

1201 tgacattaga aagccttaga gagccttttc tttttctttg agaccgagtc tcactctgtt

1261 acccaggctg gaatgcagtg gcatgatctc agctcactgc aacctctgcc tcctaggttc

1321 aagcaattct cctgccttag cctcccgagt agctgggatt acaggtgcac accaacatgc

1381 ctggctaatt tttgtatttg tagtagagat ggggtttttgc catgttagcc agcccggtct

1441 caaactcctg acctcaggtg atctgcccat cttggcctcc caaagtgctt ggattacagg

1501 catgagccac cgtgcccgac ctagagagcc ttcttgatgt gacttgcaca aggtggcaga

1561 gttagagaca gagagaggcc tggaatcgac ccctcctgct tctacagata gtccttacca

1621 tactctgcaa tgttgcctct ggccatcata atgcacaaag gcagataagc aaaaggacaa

1681 ggacaagtcc attgaaaata catttttcaa tattaaagca aaagaaaagc atccaggaat

1741 aagaaacaaa gaggacatgc agtcatatat gcaaggtgtc ctctacaaag ataaagaatg

1801 ccccaaaccc agttgtcaag atcactggca gggactcctg ggcccacatg ctcttcctaa

1861 acaacccctc catctccttt ctcagaactc agcagtaggc cttgcctcag atccaaggtc

1921 actcggaaga ggccatgtct accctcaatg acactcatgg aggaaatgct gagagaagca

1981 ttcagatgca tgacacaagg taagactgcc aaaaatcttg ttcttgctct cctcattttg

2041 ttatttgttt tattttttagg agttttgaga gcaaaatgac aacacccaga aattcagtaa
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Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 35 of 42

10/537963

FIGURE 23C
(CONT'D)

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2101 atgggacttt cccggcagag ccaatgaaag gccctattgc tatgcaatct ggtccaaaac
2161 cactcttcag gaggatgtct tcactggtgg gccccacgca aagcttcttc atgagggaat
2221 ctaagacttt gggggtaagt cagttgcctt ccatcccatg tcgtagggat tctctggctg
2281 acagaagctg atgcggtata ggtcacatac agaattcaat ccaatttgaa gaattgggat
2341 ccaacctgat gtcttcttta tgtctaacac agtgggccaa atcaggggtg catcagagaa
2401 gttatcactt agatcacctc tgggtgatct tatgtcacct tttggttttg gggcttgtat
2461 atgcaggggt tcccccattc ccagttccat ttgccagaat cccaggcata cctgctccct
2521 ggaaatgccc catgtggttg aggaaacaga ttcgaacaag aaaaagacaa aattcttggc
2581 acctccactg cttcctttag gcattcctca cagctccaag tcaggagcca gagcttccaa
2641 ccttgtcttt gcctgctagc agtgatgatt tcagctcatc cactgctgcc tctgttctct
2701 ccccaggctg tccagattat gaatgggctc ttccacattg ccctgggggg tcttctgatc
2761 atyccagcag ggatctatgc acccatctgt gtgactgtgt ggtaccctct ctggggaggc
2821 attatggtga gtaaaagaat agcagccatt tgggaaatgg tgcagacaaa aatgttaaaa
2881 ggctccacag ggatatgcca gattatttct gtgttgaggg aaatatatga gtaggaaata
2941 ttattgggtt aaagtaatta agaagacagg ttgaccaaat tgagtataaa tcccatggtt
3001 gagagtcagt ggtcctgttt catgtgaatt cagagaaagg ggccctgcat ggatctcaca
3061 gggactgtcc aaagcaagaa ctctccaaag tcagttctgg tggggagggt ggccctagac
3121 atttagacta gatagcaaga tgttttggaa agcaagaggc agcaggaaca tccacttcca
3181 tctacccctt cttgcttaca attctgtttg gttactatgg tacctggtga aacctgtccc
3241 atcacaagtc agtctcattt tgcttatcga cagagcagca ctcttttgac gtttttatgta
3301 catgttttcc aaatctgtaa ccctgtctgg gtgtgatttg agttctgtct ctttggtctt
3361 actatattcc tgtcacagat ccccagatga ttgagtaaaa ggcatgaatt tagtgtcact
3421 gagcctgaat aaaggaggaa tatgacagct gaaaaatgaa tacaactgat aaaaatgggt
3481 ggatggttgt gtgaaagttg ctgaaagtgt aggcttcttt ctgaccagtt atcaatgtta
3541 aaaagtgatc tcctctctcc tctatctcct gtcttgccca ccccctctcc atctccccca
3601 cctctctttt ttacagtata ttatttccgg atcactcctg gcagcaacgg agaaaaactc
3661 caggaagtgt ttggcaagta accatatgtc cttctttccc acatgtcaga gaagtaccta
3721 tttttttcgg ttaaaaactg agacccttaa aaagccatgg tatcacagcc tctcagccct
3781 aaaaagcaaa gaccctccac aatgttattg tgattttatt tatgaaaaac ttagaagcga
3841 gatcatctga agtatgttca tgggaacaga actaaaagca gatccatgaa aaccatacct
3901 acagtcttaa gaacgttaaa tgctgtgtga aaataataga cctttcngaa gccctatcat
3961 ttctcccaga tcaccattta ggaaattatc tgatcaatgt catgattgat tcaaaattct
4021 agctaagcca tttttggtc gtaacattga acaagtcagt ttacctctat gttcctgagt
4081 tttcacctgg aaaggaaggg taacagtcct tgctaccatg tgacgtccaa tggagtgaag
4141 gcagtagagt gtgtgatggt gcttcacagg actataggta ctacactgtg gtcttgccca
4201 taaaacccct ggggaactca tatagatcca gaggaaactg gctgcaggcg cgagcgatgg
4261 gtgaaaagag tttagcagca agttcgctcc caaaaaattc ctcccccaac actgttacta
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Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 36 of 42

10/537963

FIGURE 23C
(CONT'D)

4321 aactgtgtca cttcataatc aatgagggaa tgggtggatt gagatggttc cttgtcttaa

4381 agtgacctga cacactcagt ttgggggggaa aactttttat gaacatcaaa ttattctcta

4441 gatacagcca gatttactga cttgccatgt gtaggtcata gagctaggaa tgaaatatgc

4501 gcaacataaa ataataatca ataatcccat atcattatgg tacttgttat ttatattttc

4561 ctgtttcaac cttttatcat ccctgcaagg tagaacattc acactgatat tctcttacct

4621 atgctaccca aagacatcag ccctaattgt attttggaag atagctgact ggggctgatt

4681 gcagcctatg tcagcaggaa tagatgttgt tactgttgtt gcttctgctt tttttatttc

4741 catttatttg atagtacaga tctagagggt tctatctgaa ccttcccaac ctatacttca

4801 taataccatc ccactaaagt gtgatacaag aaacttcttc actctcttcc ctctacctat

4861 ttatgaaggc agataataaa ctggataata tttatcttca cttattcaac aaacatttat

4921 tgagtgccta ctaggatggt ggcagtggca gtgaaggaaa tgcaaggata caagatatag

4981 aatcaagggt tactcttaga atttttgctt tataaaacag atggatggtg aatgagatag

5041 ggaagactga gaaaacaaca ggatagagac atgattttat tttatagtga caaagaggct

5101 aaaaagaact gagagaactt cagtatattt agttgtagtt gctttgtgag tcagggcagt

5161 tgcatttgga attccctccc agattatgtt ttccaaaggg aaatcaaacc caattaataa

5221 atctgtgtct ccatttcagg tcaaaggaaa aatgataatg aattcattga gcctctttgc

5281 tgccatttct ggaatgattc tttcaatcat ggacatactt aatattaaaa tttcccattt

5341 tttaaaaatg gagagtctga attttattag agctcacaca ccatatatta acatatacaa

5401 ctgtgaacca gctaatccct ctgagaaaaa ctccccatct acccaatact gttacagcat

5461 acaatctctg ttcttggtaa gtgttcttgg taagtgtgag attggatttc tctccaggga

5521 ggaaggatga cttgtttatt atgagcatga actctgaatt ccagaccacc tgtgtttgtc

5581 tgcttcaact gattattcat accttacttt ctatcagcaa tacacattaa ccatctgttg

5641 tgtgccaaaa gttgtgttaa gagttagggt tataaagatg ctgtctcctg tactagcagt

5701 tctcacagct attcattact tgtctaaaga attgatctct taatcgttca attatagtca

5761 acaataactt actgaacacc aacaatgttc tttgtgccat tattacattt tcaccttcat

5821 tcttctgttg tttttcaggg cattttgtca gtgatgctga tctttgcctt cttccaggaa

5881 cttgtaatag ctggcatcgt tgagaatgaa tggaaaagaa cgtgctccag acccaaatct

5941 gtaagtagta gcctccagca ccgtggtcaa tgtctgctgc ccttgaagat ttattcagac

6001 ttgagtttta ataaatgact tgataaggat ataagcacct gcaaaaaaat tttggcattt

6061 aaaggcatat aataaatgac ataagtagca taaaaaccag gaggtatttg ataaatgttt

6121 gtggagattg ttgacaaagg tgtcagttgt aaaagtaaag aatggttgt ttaattttct

6181 gttttagaac atagttctcc tgtcagcaga agaaaaaaaa gaacagacta ttgaaataaa

6241 agaagaagtg gttgggctaa ctgaaacatc ttcccaacca aagaatgaag aagacattga

6301 aattattcca atccaagaag aggaagaaga agaaacagag acgaactttc cagaacctcc

6361 ccaagatcag gaatcctcac caatagaaaa tgacagctct ccttaa

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 37 of 42

10/537963

FIGURE 23D

Mouse CD20

```
   1 gaattccttt tttttttttt tttttaaaga tttatttatt attatatgta agtacactgt
  61 agctatcttc aagtacttga gatagaagag gccaactgat ctcagctgtg agtggctaat
 121 ttggccctta agccttggag ccttggagcc ttggagaccc aggcgtttga aaactcaatg
 181 agtggacctt tcccagcaga gcctacaaaa ggtcccctcg ccatgcaacc tgctccaaaa
 241 gtgaacctca aaaggacatc ttcactggtg ggccccacac aaagcttctt catgagggaa
 301 tcaaaggctt tgggggctgt ccaaatcatg aatggcctct tcatattac cctggggggga
 361 ctgctgatga tccccacagg ggtcttcgca cccatctgtt tgagtgtatg gtaccctctc
 421 tggggaggca ttatgtacat tatttcagga tcactcctgg cagctgcagc agaaaaaacc
 481 tccaggaaga gtttggtcaa agcaaaagtg ataatgagct ctctaagcct ctttgctgcc
 541 atttctggaa taattctttc aatcatggac atacttaaca tgacactttc tcattttta
 601 aaaatgagaa gactggagct tattcaaact tccaagccgt atgttgatat ctacgactgt
 661 gaaccatcta attcctcaga gaaaaactcc ccatctacac agtactgtaa cagcattcag
 721 tctgtgttct ctgggcattct gtcggcgatg ctgatctctg ccttcttcca gaaacttgtg
 781 acagctggta ttgtggagaa tgagtggaaa agaatgtgta ccagatccaa atctaatgtg
 841 gttctgctgt cagctggaga aaaaaatgag cagacgatta aaatgaaaga agaaatcatt
 901 gagctaagtg gagtatcttc ccaaccaaag aatgaagagg aaattgaaat tattccagtg
 961 caggaggaag aagaagaaga agcagaaata aattttccag cacctcccca agagcaggaa
1021 tccttgccag tggaaaatga gatcgctcct taaactcttt tcttttctaa gcattattgt
1081 ttagagagct tccaagacac atagttaccc tcatctcttg tggccttcca caatctattc
1141 tccatatttt cacagcttaa ctttgcatag agaagccaca tctagctctc cttcacattt
1201 gaagaatgca gtgattataa aagattgtct tttgccttgc ttagggagtc ttacactggc
1261 agaaacgctg aagaatccaa ttctcattca cctttttcctt ggatgtgtgt ctcagtagtg
1321 gtaatggttt ttccgcattt cctccatcag cagttacagc agaaggagtc agagagttca
1381 gggaattc
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Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 38 of 42

10/537963

FIGURE 24

Macrophages and natural killer cells express transgenic human CD16

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 39 of 42
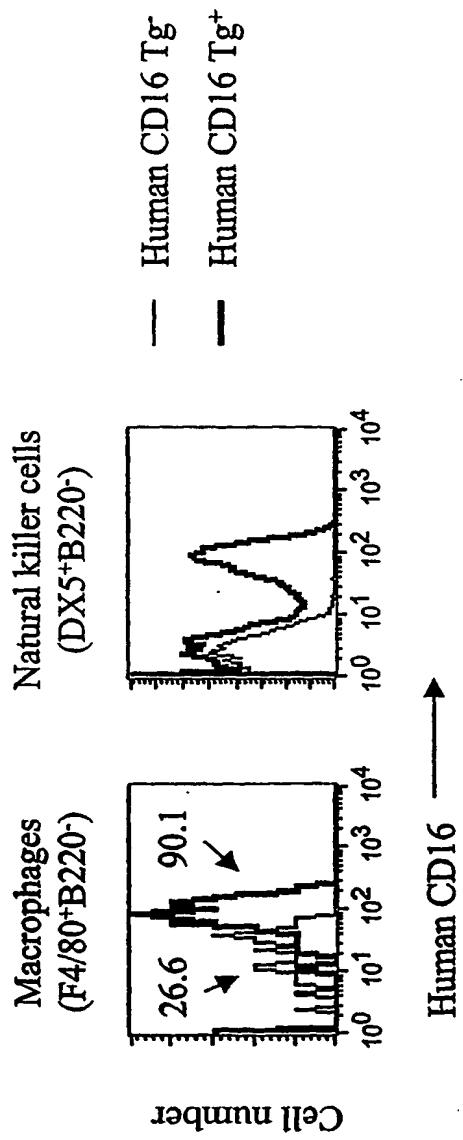
10/537963

Figure 25A

Fc Receptor gamma Chain

1 mipavvllll llveqaaalg epqlcyilda llflygivlt llycrlkiqv rkaaitsyek

61 sdgvytglst rnqetyetlk hekppq

Figure 25B

1 cagaacggcc gatctccagc ccaagatgat tccagcagtg gtcttgctct tactcctttt

61 ggttgaacaa gcagcggccc tgggagagcc tcagctctgc tatatcctgg atgccatcct

121 gtttctgtat ggaattgtcc tcaccctcct ctactgtcga ctgaagatcc aagtgcgaaa

181 ggcagctata accagctatg agaaatcaga tggtgtttac acgggcctga gcaccaggaa

241 ccaggagact tacgagactc tgaagcatga gaaaccacca cagtagcttt agaatagatg

301 cggtcatatt cttctttggc ttctggttct tccagccctc atggttggca tcacatatgc

361 ctgcatgcca ttaacaccag ctggccctac ccctataatg atcctgtgtc ctaaattaat

421 atacaccagt ggttcctcct ccctgttaaa gactaatgct cagatgctgt ttacggatat

481 ttatattcta gtctcactct cttgtcccac ccttcttctc ttccccattc ccaactccag

541 ctaaaatatg ggaagggaga accccaata aaactgccat ggactggact c

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 40 of 42

10/537963

FIGURE 26

FACS staining of mouse CD16

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 41 of 42
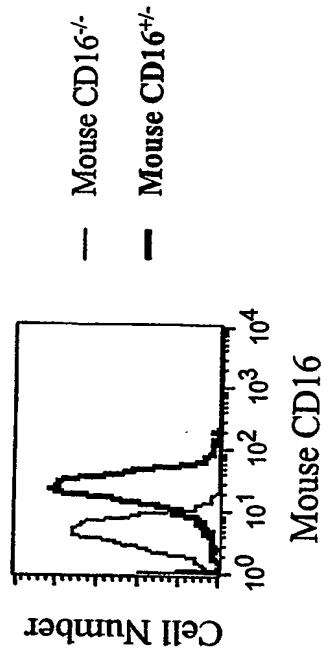
10/537963

Figure 27

Expression of mouse CD64 in peripheral blood of CD16-/- mice
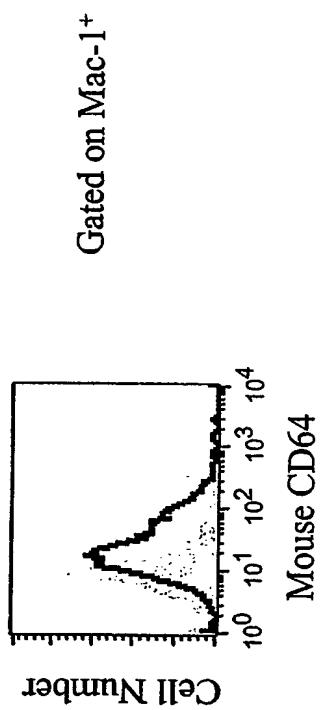
Gated on Mac-1+

Inventor: CHAN et al.
Docket No.: 11669.0150USW1
Title: TRANSGENIC MICE EXPRESSING HUMAN CD20 AND/OR CD16
Attorney Name: Katherine M. Kowalchyk
Phone No.: 612.371.5311
Sheet 42 of 42

10/537963

Figure 28

Human CD20 expression in peripheral blood

Isotype control

hCD20 Tg+ mouse

Human blood